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Contents

EDITORIAL:
Editorial Notes 865
The Railways' Appeal to the Public..... 866
The Southern Pacific's Student Course in Railroading..... 866
President Rea's Remarkable Statement..... 866
New Books 867

LETTERS TO THE EDITOR:
A Plan for Lessening Pass Routine; by H. W. Conard..... 868
Speed Limit Rules and Their Enforcement; by William G. Landon.. 868

MISCELLANEOUS:
Operating Capacity of Single Track Divisions; by W. M. Baxter.... 869
The Rate Advance Hearings..... 871
*Philadelphia & Reading 4-4-0 Type Locomotive..... 872
Starve the Railroads and We Starve Ourselves; by Frank A. Munsey 875
Extensive Reduction in Canadian Rates Ordered..... 877
What Is the Matter with the Southern Pacific Student Course?; by Norman Collyer 880
The New Haven Situation..... 883
Metal Cutting and Welding with Oxygen and Pintsch Gas..... 887

MAINTENANCE OF WAY SECTION

EDITORIAL:
Editorial Notes 889
A Coal-Tar-Creosote Mixture 889
*A Study of Derailment Statistics..... 890
New Books 890

LETTERS TO THE EDITOR:
Hints on Efficiency and Organization in Maintenance; by M. D. Gibbs 891
The Opportunities of a General Roadmaster; by H. G. Olmstead.... 891

MISCELLANEOUS:
*Re-erecting the St. Francois River Bridge, Quebec..... 892
Production of Rails in the United States in 1913..... 895
Concrete Fence Posts 895
The Economical Operation of Work Trains..... 896
Abstract of Engineering Articles..... 901
American Wood Preservers' Committee Appointments..... 901
Economy During Retrenchment 901
*Extensive Great Northern Snow Shed Construction..... 902
*Winter Railroading Under Difficulties..... 906
An Unusual Method of Collecting Scrap..... 906
The A. R. E. A. Committee Assignments for 1914..... 907
The Use of Coal Tar in the Creosoting Industry; by Hermann von Schrenk and Alfred L. Kammerer..... 909
*Operation of a Ballast Crusher at Coleman, Tex.; by Jos. Weidel.. 912
*An Interesting Steel Bunk Installation..... 913
*The Shoffner Cushioned Guard Rail Fastening..... 913
*A New Type of Car Buffer..... 914

GENERAL NEWS SECTION..... 915

*Illustrated.

Regardless of the opinions railway men may hold about the advisability of the United States government undertaking the construction of railways in Alaska, now that the government has definitely committed itself to this program, they are desirous of seeing the experiment given as fair a trial as possible. The first essential of a successful railroad is proper location. Much, therefore, depends upon the selection of the chief engineer. While the administration has not indicated its intention regarding this matter, there have been many conjectures. It has been conjectured that the officers in charge of the construction of the Panama Canal may be given charge in Alaska. Because of the practice of having harbor and other government construction work done under the supervision of the engineer corps of the army, some have believed that this new work would be turned over to this department. Political pressure is also evident, newspaper despatches stating recently that one Illinois congressman has appealed to the President in behalf of the present city engineer of Chicago. Most people seem to lose sight of the fact that this is a railway rather than a harbor, a canal or a political problem. When undertaking the construction of a large railway mileage in an unsettled, rough country, an outside corporation would naturally select for the position of chief engineer a man of long experience in railway location and construction under similar conditions. The railway engineers must be, and able railway engineers are, not only proficient in their own profession but also experts in the art of railroading. A railway is a machine designed for a particular purpose and the designer must be familiar with the problems met with in its use. Many such men are available if the administration desires to secure them. The selection of the chief engineer will in a large measure indicate the extent to which political influences will outweigh experience and ability in the conduct of the project.

Selection of Alaskan Railway Engineers

A history of the recent developments in the New England situation, a sketch of the situation as it is at present, and an explanation of the reasons which led the directors of the New Haven to accept the attorney-general's terms of the dissolution rather than face a suit, are contained in a statement given out Monday by the New Haven management. The essential parts of this statement are published elsewhere in this issue. As an indication of the complexity of the whole thing there was, almost coincident with the explanation of the reasons that the New Haven management preferred to come to the attorney-general's terms rather than face a suit, the refusal by H. B. Whipple, treasurer of the Billard Company; Samuel Hemingway, former treasurer of the Billard Company, and Samuel Morehouse to give the Interstate Commerce Commission any information in regard to this company's relations with the New York, New Haven & Hartford. The present management of the New Haven was selected by the board of directors with the expressed purpose, probably, of turning over a new leaf. What's done can't be helped. Mr. Elliott takes pains to point out that the transactions between the New Haven and the Billard Company took place years before he had any connection with the company and that the New Haven is not now refusing to give to the Interstate Commerce Commission any information which it has at its disposal. It is unfortunate while Mr. Elliott for the board is assuming this attitude that a company of which Mr. Billard, a member of the New Haven board, is the head should assume a contrary attitude. The directors express the opinion that if a dissolution plan had been fought out by the company in its present situation the result would have been a receivership for the New Haven. This is doubtless true and it seems unquestionable that the best thing the stockholders can do is to accept the plan agreed on by the government and the company and give the present management of the New Haven a fair chance to work out the property's salvation.

The Railroad Situation In New England

THE RAILWAYS' APPEAL TO THE PUBLIC

SENATOR CUMMINS, of Iowa, on Monday, on the floor of the Senate criticized the railways for carrying on a campaign to create a public opinion favorable to an increase in rates. He charged that in carrying on this campaign the railways have been misleading the public. It is true that the railway managements have been trying for years to change public sentiment toward the railways. The need for doing this was created largely by the flagrant misrepresentations of railway matters by muckrakers in the magazines and a certain class of public men from the Chautauqua platform. And among the public men who have most persistently and flagrantly misrepresented railway matters in public addresses is Senator Cummins himself.

If muckrakers have a right to sell misrepresentations of railways to magazines, and United States Senators have a right to sell misrepresentations of railways in the form of Chautauqua speeches, why have not the managers of the railways a right to present their side of the case to the public? If the railways have misrepresented, they have only been fighting the demagogues and socialists with their own weapons. As a matter of fact, what have the railways actually done? They have put their officers on the witness stand before the Interstate Commerce Commission and had them testify under oath to what they believe to be the facts regarding the railway situation. Is Senator Cummins prepared to go on the witness stand and swear to all the statements which he makes from time to time regarding railways?

In addition, the railway managers have furnished to the newspapers in convenient form for publication, the gist of the testimony that they have introduced. Is there anything wrong about that? Besides, when in recent years railway managers have been invited to make addresses or write magazine articles or give statements to newspapers on the railway situation, many of them have accepted the invitations. Is there anything wrong about that? When did it become right for the chairmen of state railroad commissions and United States senators to use the prestige of their official positions to secure dissemination of the grossest misinformation regarding railways for the purpose of influencing public opinion, and wrong for railway managers to take advantage of such opportunities as offer themselves to present their side of the case to the public? Senator Cummins' plaint is absolutely without merit, and shows nothing except that as a statement he is still as much of a demagogue as ever.

THE SOUTHERN PACIFIC'S STUDENT COURSE IN RAILROADING

WE publish on another page a notable paper on the Southern Pacific's Student Course in Railroading, by Norman Collyer, chief clerk to President Sproule, of this road. The Southern Pacific in putting this course into effect has made one of the most remarkable efforts in the history of railway transportation to train young men for railway officers. The course has received numerous criticisms, including some from officers of the Southern Pacific itself. Mr. Collyer states these criticisms frankly and then answers them vigorously, but logically and fairly, and his able paper deserves a careful reading.

The *Railway Age Gazette* entertains, and often has expressed, the greatest admiration for the type of officer which has been developed on the railways of the United States and the results which he has got; and equally unstinted admiration for the American railway officer has been expressed by foreign visitors who have studied the results of railway operation in this country. And many of our successful railway officers are men who entered the service with but little education and have risen through the ranks. Starting with these facts as a premise many successful self-made railway men reach the conclusion that the best way to make railway officers is to let them just grow like "Topsy," and that men who are trained for officers, as young men are being trained on the Southern Pacific, are likely to prove unpractical and incapable theorists. But is that a fair conclusion? Is it the kind of conclusion which these same self-made men draw when they are reasoning regarding their own family affairs? Here is a railway general manager, or vice-president, or president, who started as a water boy, or a fireman or a clerk, and who got all of his education by private reading and study and by attending the great "University of Hard Knocks." Does he, because he has been successful without having received a college, or perhaps even a common school, education, decide not to send his boys to college? Almost every successful self-made man sends his boys to college. Why? Because he feels sure that he has succeeded in spite of, and not because of, his lack of early education. He knows that it is only the exceptional man who rises in spite of lack of thorough education and training, and that most men will be much better off if given a good education than if not given it.

Now, why doesn't the same thing apply in the railway business? It is true that most able railway officers are self-made men, but isn't that because a very great majority of all the men who enter the railway business are men without college training? And isn't it true that in proportion to the number of college men who enter railway service there is a very large number of higher officers who are college trained men? And if an ordinary college training will help to equip a man for success in the railway business, then why will not a special course in railroading, such as that of the Southern Pacific, help him still more? It is inconceivable to us how any intelligent person who has studied the Southern Pacific's Student Course in Railroading can entertain a doubt that a young man who has taken it will be better fitted to become an officer of the company than will a young man who has spent four years in doing anything else on the railroad.

The student course of the Southern Pacific is comparatively new. There has not been time yet to judge of its value. But there is no difficulty in judging of the value of the example which the management of the Southern Pacific is setting in trying to work out a scientific scheme for training men for railway official work. The course may have its shortcomings. If so, they can be remedied. In any event, the principle underlying it is right, and the time will come when the most hard-headed railway manager will recognize this. And the time will come when departments for training all classes of railway men for the dual purpose of enabling them to perform their specific duties better, and of broadening them out so that they will have some understanding of the duties of all departments, will be features of every well organized and well managed railway line in this country.

Is not the army of the United States better officered because there is a West Point? Is not the navy of the United States better officered because there is an Annapolis? Is not Germany better off both as a military and as an industrial nation because it is leading the world in the field of vocational education? Only a man who can and will answer these three questions in the negative can consistently argue that the adoption of some plan or plans for training railway men in all of the ranks of the service, to do their work better would not be beneficial to the railways.

PRESIDENT REA'S REMARKABLE STATEMENT

THE statement presented by President Samuel Rea, of the Pennsylvania Railroad System, last week to the Interstate Commerce Commission in the hearings on rate advances is one of the ablest and most remarkable discussions ever prepared regarding the railway transportation problem in the United States. For, while it was meant especially to set forth the position of the Pennsylvania system, it actually, because of the place which the Pennsylvania system occupies, deals by implication with the general railroad problem of the country.

The Pennsylvania system, regarding it from all the various points of view, is the greatest system of rail transportation, not only in the United States, but in the world. Of all the great

American railway systems it has been managed for a long period of years most nearly in accord with the highest standards set by contemporary public opinion. Its capitalization has never been watered; and a substantial part of its stock has been sold at a premium. It has never paid what the most critical would call "excessive dividends." Its usual dividend rate has been 6 per cent., and surplus earnings have been invested in the property to raise its credit and enable it to give better service and have not been capitalized. A very high standard of service has been maintained, and this necessarily is extremely expensive. At the same time, the management has used every endeavor to keep the cost of the service as low as possible. Some railway managements doubtless have obtained better results for a time than that of the Pennsylvania. But the true test of good management is not the results attained during a brief period, but the results attained over a long period. And the primary essential to getting good results over a long period is a good organization. Geniuses are scarce, and a good organization with a well-designed system for perpetuating itself is essential to enduring success. The management of the Pennsylvania has recognized these fundamental principles, and it is because it has that it has been able to maintain and improve the property and service while charging low rates, and earning and paying dividends regularly for many years.

Nobody who is familiar with the facts will deny that in all essentials the foregoing statements regarding the property and its management are correct. Some criticize the Pennsylvania management for this and some for that; but every person whose opinion is entitled to respect will concede that, on the whole, year after year the Pennsylvania Railroad system has been one of the best managed business enterprises in this or any other country.

Now, with such a record as the foregoing what does the management of the Pennsylvania find that the present situation of the property is? It finds, as Mr. Rea shows in his remarkable statement, which was published in the *Railway Age Gazette* of April 10, that in spite of all this able and conservative management the percentage of return on the investment in the property is declining. In 1903 the net operating income of the entire system was 7.49 per cent. on the total investment from capital and surplus; in 1910, 7.41 per cent.; in 1913, only 5.48 per cent. "If we add to the property investment the expenditures for additions and betterments provided from surplus income from 1887, the system earned only 6.66 per cent. on its investment in railroad and equipment in 1903, and 4.78 per cent. in 1913." On the lines east of Pittsburgh only 4.81 per cent. on the investment was earned during the year ended June 30, 1913. A valuation of the property would disclose that the net return on its fair value is still less. It will be noted that Mr. Rea did not choose the results of recent lean years, such as 1908, 1909, 1911 or 1912, to compare with the results of earlier years. He chose the results of the relatively prosperous years 1910 and 1913 for comparison with the results of earlier years. The reason why the net return on the total investment shows a tendency to decline is strikingly indicated by the figures given showing the net return on the investment made during the year 1903-1913. During this period the property investment of the system increased $530,000,000, while the net operating income increased only $12,000,000, yielding a return on the additional investment of only 2.23 per cent.

It has repeatedly been said that while weak railways in different parts of the country may need higher rates, the strong roads, such as the Pennsylvania, do not need them and that it would be unjust to the public to grant an advance by which these strong roads would profit. Mr. Rea's testimony does not show that the Pennsylvania system is now needy in the sense that if it is not allowed to charge higher rates it will soon be in the hands of the sheriff. But they do show that the tendency of the net earnings of the Pennsylvania system is in the wrong direction; and if this tendency be not arrested it is but a matter of years until the Pennsylvania's position will be greatly weakened. And if this is the situation in which the Pennsylvania finds itself, in how much worse a situation are the weaker lines in the same territory!

It may be said that the Interstate Commerce Commission should deal with existing conditions, not with tendencies, and that it should wait until such roads as the Pennsylvania actually need higher rates. But does the wise man, when he realizes that his health is drifting downward, do nothing to check the tendency? On the contrary, he begins to take steps at once to arrest it, knowing that it is much easier to prevent a breakdown than to cure it and remedy its after effects. The health of the railways of this country should be dealt with as the health of a man should be dealt with. Those that are sick should be given the treatment necessary to restore them to health. Those that have an unhealthy tendency should be given the treatment necessary to arrest that tendency.

Many statistics have been compiled and presented to the commission to show that the situation of the eastern railways is not so bad as their officers contend. The most superficial examination of most of these statistics will show that they are made on wrong bases and do not indicate what they purport to. It has been pointed out, for example, that the net operating revenue and the net operating income of many railways in eastern territory were larger in 1913 than iny any preceding year since 1910. But such figures alone show nothing. The real question is, what has been the tendency of the percentage of net operating income to the investment in the properties? The investment from capital has been increasing all the time. A return must be paid on additional investment if it is to continue to be made. The real question at all times, therefore, is, is the net operating income increasing in proportion to the legitimate increase in investment? Mr. Rea has shown conclusively that on the Pennsylvania system it is not. Manifestly, net operating income must increase more rapidly in future or investment will increase less rapidly; and investment already is increasing too slowly for the good of the country.

NEW BOOKS

Application of Power to Road Transport. By H. E. Wimperis, M.A., M.I.E.E. 125 pages, 4¾ in. by 7¼ in., illustrated, bound in cloth. Published by D. Van Nostrand Company, 25 Park Place, New York. Price $1.50.

This book is based on a series of six lectures delivered at the Finsbury Technical College. Little has hitherto been written on this subject, and there is a paucity of published experimental data to serve as a substantial basis for design. The writer has endeavored to formulate a working theory based upon such tests as he found available or was able to make independently with the accelerometer. The book begins with a general survey of the subject and deals with the use of steam power, internal combustion engines and electricity. The resistance to motion in relation to load, speed, wheel diameter and nature of tires is considered, as well as the amount of power necessary. A chapter is devoted to the measurement of power, speed and resistance, and the use of the accelerometer and loss of power in engine friction and in transmission gears. Considerable space is devoted to the general type of steam and internal combustion engines and the vehicles on which they are used. The same chapter considers the horsepower necessary per ton and the use of gearing. An ideal curve of tractive effort is given. The fourth chapter deals with the relationship of engine dimensions and gear ratios to the work to be done, and takes up the design of vehicles propelled by internal combustion engines and steam engines. Braking is also considered in this chapter. There are three appendices dealing with the energy stored in a moving vehicle, brake horsepower tests made by the Royal Automobile Club and a road test report form.

Letters to the Editor

A PLAN FOR LESSENING PASS ROUTINE

Denver, Col., March 8, 1914.

To the Editor of the Railway Age Gazette:

At present the railways generally follow the practice of exchanging passes or forms of free transportation for their various officers and employees. This entails an enormous annual expense (as the forms are renewed each year) for the printing of the various forms of passes and the blanks upon which they are requested from exchanging lines, together with the office record blanks, as well as for the hire of necessary clerks by both the requesting and issuing lines to perform the great amount of clerical labor connected therewith.

After all this expense has been incurred these passes serve only as credentials to identify the holder as a person eligible under the law or custom and to whom the employing officer has signified his desire that the courtesy of free transportation be accorded. The act of according the free transportation on this credential is left to the discretion of the conductors of the honoring lines, guided, of course, by instructions issued by the operating or auditing departments. The record of the transaction finally finds its resting place in the file of the auditor of the honoring line through reports turned in by the conductor with the lifted transportation.

It has become almost the universal practice for the issuing line to honor without question practically every such request; the officer of the issuing line who has the authority to grant the transportation relies implicitly upon the recommendation of the officer of the requesting line.

Under the circumstances it seems to me the roads could save a great deal of expense entailed by the present method by doing away with the various forms of exchange annual and trip passes and by issuing the necessary standing instructions to conductors, letting them handle the matter just about as they do now and in addition do away with a great deal of the duplication of work that prevails under the present system.

It would be necessary for the various lines to agree to the plan by subscribing to an organization or association. If thought necessary this could be in charge of an executive to promulgate the rules of the various lines. The issuing of transportation over any line in the association would be left to the discretion of the authorized officer of the line employing the person for whom transportation was desired. This officer would issue a credential specifying the name of the employee or member of an employee's family, position with the company, residence, road or roads over which the transportation was to be used, territory or points between which it would be good, and fixing the time limit, this being practically the same information that is now contained on a request blank. For the information of the honoring line he would send a duplicate to the corresponding officer of the line or lines over which it is drawn. For representatives required to travel frequently over any one road this could be in the nature of a term pass with the limit of a certain period, or good until revoked. Trip passes would be issued only in one direction, with a separate credential for the return. Conductors would be supplied with signature slips similar to those now in use by many lines, which would show where honored, be signed by the user of the credential for each trip and turned in by the conductor with his collections, the last conductor honoring a trip credential lifting it and any conductor granting a stopover noting on the credential to what point honored.

By this plan each company would issue transportation only for its own employees, which would amount to about the same labor and require about the same stationery that are necessary under the present plan to make the request, and that would constitute the entire transaction except the part performed by the conductor and auditor, which would be about as now.

It would be necessary for the issuing officer to keep an accurate record and in order to prevent misuse keep a close check on all outstanding unexpired credentials and require the employee to surrender them should he leave the service, or otherwise forfeit his right to transportation, but this hazard would not necessarily be increased by the plan. There would be nothing gained by doing away with trip or term passes for employees of a road over its own line.

The objection might be made that this would not fit in with the present Interstate Commerce Commission or state commission supervision, but I see no reason why such an objection cannot be overcome, as the sentiment of these bodies seems to be in favor of economy.

Other details, such as limiting this class of travel to certain trains, prohibiting it at certain times, etc., could be handled by standing instructions to conductors or rules promulgated by the association. The advantage of furnishing a copy to the officer of the line over which the credential is drawn would be to allow him to check the use of the privilege and to call attention to any inconsistencies.

H. W. Conard,
Chief Clerk to Receiver, Colorado Midland Railway.

SPEED LIMIT RULES AND THEIR ENFORCEMENT

New York, March 28, 1914.

To the Editor of the Railway Age Gazette:

On many railroads the problem of speed reductions does not seem to have been worked out scientifically. Every order which requires speed to be reduced unnecessarily is a hindrance to keeping time and an extra expense, and is liable to result in high speed on unfavorable stretches.

Apparatus which requires a speed reduction, such as track troughs, is often located at a point where otherwise the speed would not be reduced. In many cases these could be placed near a tower or curve or at some other place requiring trains to slacken to 20 or 30 m. p. h. and thus eliminate an unnecessary delay.

The next class of speed restrictions under consideration are those which require an excessive speed reduction—for instance through a station serving a large town, 20 m. p. h. is often required. There is no reason why 30 m. p. h. should not be allowed. This rate through such a station is certainly as safe as 70 through a country station. Another example is where a speed of 6 m. p. h. is required over a temporary track or bridge. Usually 10 or 15 m. p. h. would be as safe. I suppose most people would reply to the suggestions in this paragraph "Safety First." My answer is "Is it not safer to be a little more liberal with the minimum speed and consequently reduce the maximum?"

All the above refers to cases where the speed restrictions are rigidly observed; but, I venture to say, there are on every road speed restrictions which are never observed, at least by the majority of engineers. The usual instances are drawbridges. I have again and again timed speeds from 60 to 70 m. p. h. over drawbridges, which were supposed to be taken at speeds varying from 30 to 50 m. p. h., and if this is done year after year without any accident or injury to the bridge, why have a speed limit?

Another absurd speed rule specifies a limit of 60 m. p. h. over a division where there are several slow downs and where quite a number of trains are required to cover the distance at an average of 50 m. p. h. or more. Obviously, if 60 m. p. h. were never exceeded, the trains would never reach their destinations on time. Doubtless there are many cases similar to this.

If all speed restrictions were consolidated to the smallest possible number, those which are unnecessary and never meant to be obeyed left out, and the speed limits, where needed, determined after careful consideration and rigidly enforced, it would probably improve discipline and increase the factor of safety.

William G. Landon.

Operating Capacity of Single Track Divisions

A Study of the Physical Limitations in Single Track Operation; Advantages of Automatic Block Signals

By W. M. Baxter
Canadian Pacific Railway, Montreal, Que.

As the rating of a railroad is based on the tonnage it hauls, this article will present, by a simple method, the important factors in train operation, which influence the tonnage-handling capacity of a single track railroad. It will also show the reduction in tonnage due to each minute's delay to freight trains, and by this process make it possible to pre-determine the maximum capacity, the effect of passenger train movements on the volume of tonnage handled, and the value of the automatic block signal system as a means for increasing the tonnage capacity, or delaying the necessity of building the second track.

The results of the argument set forth in this paper are presented in the following recapitulation of data and results:

Tonnage rating of engines or average tons per train-mile, 2,000 tons.
Running speed of freight trains, 20 m. p. h.
Running speed of passenger trains, 30 m. p. h.
Length of division under discussion, 100 miles.
Total number of passing tracks, 20.
Length of restricting district, 8 miles.
Total operating time for freight trains in traversing restricting district, 52 min.
Running time of passenger trains through restricting district at 30 miles an hour, 16 min.
Delay caused to freight train movements through restricting district operating under train order system, by passenger train movements, 38 min.
Delay caused to freight train movements through restricting district operating under absolute permissive block system, by passenger train movements, 28 min.
Reduction in tonnage capacity per 24 hours per one passenger train, under train order system, 2,090 tons.
Reduction in tonnage capacity per 24 hours per one passenger train under absolute permissive block system, 1,540 tons.
Percentage of reduction in delays to freight traffic by operating under absolute permissive block system instead of by train orders, 27 per cent.
Maximum tonnage capacity of district per 24 hours with no interference from passenger train movements, 79,200 tons.
Tonnage capacity per 24 hours of district operated under train order system, with interference from 10 passenger train movements, 58,300 tons.
Number of cars handled per 24 hours' capacity at 40 gross tons each, 1,457 cars.
Tonnage capacity per 24 hours of district operated under absolute permissive block system, with interference from 10 passenger train movements, 63,800 tons.
Number of cars handled per 24 hours' capacity at 40 gross tons each, 1,595.
Average time required by freight trains to traverse division of 100 miles, 9 hours.
Average speed of freight trains over division, 11.1 miles per hour.

In train operation the factors which will bear more directly on the tonnage capacity of single track are:

The number of passing points.
The distance between passing points.
The length of the operating district or spacing distance between terminals.
The tonnage rating of locomotives.
The distribution of power.
Facilities for conveying train movement information to trainmen and enginemen (either by train orders or by automatic block signal system).

It is assumed that the yards at either end of the district which is being analyzed, are capable of receiving and forwarding the maximum car handling capacity of the district. In this analysis passenger trains will be considered as freight traffic delayers, because by virtue of their superiority in both class and direction, and the greater speed at which they move, freight trains are delayed in both directions by passenger trains meeting and passing them. Track resistance governs the tonnage rating per train, with engines of a given tractive effort, and the number of trains depends upon the speed and the distance between the passing points. It is essential, therefore, to avoid detentions, that no engine should be loaded beyond its rated capacity, as this will prevent it from making the speed necessitated by the varying distances between passing points.

The principal factors required in constructing a formula which will represent both the important fixed physical conditions, and the unavoidable operating detentions met with in single track operation, are set forth as follows:

C = Capacity of the section of the track between any two passing points in both directions in tons per minute.
D = Distance between the passing points in miles.
S = Average speed in either direction between any two passing points. This is ascertained by taking the total operating time required by the trains to enter and leave the passing tracks at both ends of the section, plus the time required to run between them, and then dividing this total time by the distance between the passing tracks. This data can be secured from the train despatcher's sheets.
W = The tonnage rating of a given locomotive over the district, or the average tons per train mile of all power.
M = 1,440 or the number of minutes in 24 hours.

From this tabulation we arrive at the following formula:

$$C = \frac{SW24}{D} \div M$$

which represents the number of tons per minute capacity between any two passing points under ideal conditions for moving freight trains with no interfering passenger trains and none of the operating detentions considered. This formula can also be used to ascertain the capacity in tons per 24 hours between each two passing tracks by eliminating the division by the number of minutes in 24 hours. When the capacity in tons has been obtained between each two of the passing points on the district, the maximum tonnage handling capacity for the entire district will be equal to the lowest maximum tonnage handled between any two passing points throughout the district; or in other words, that section of track over which the least number of tons can be handled per minute becomes the restricting throat or funnel which limits the maximum capacity of the other sections of track throughout the district.

The information necessary for substitution in this formula can easily be secured from a despatcher's train sheet, and the train performance or tonnage reports. If, however, a profile of the district is available, a velocity curve (showing the speed of trains in miles per hour) may be projected on it, using the grade line as the base or datum line; then by ascertaining the area between the speed curve and the grade line, for the distance between each of the passing points, and dividing this by the miles between the passing points the average speed in miles per hour of the trains running over this section will be obtained.

The relation between the speed of trains and distance between passing points is one of the most important factors to be secured. A few concrete examples will here demonstrate the value of this data. Assuming that 30 miles an hour is the average speed of trains moving between two passing points which are 7½ miles apart, then $\frac{30}{7.5}$ = four trains, or in other words, two trains each way will be the capacity per hour between these passing points, without interference. Again, assuming 7½ miles as the distance between passing points, and the average speed attained only 15 miles per hour, then $\frac{15}{7.5}$ = two trains, or one each way between these passing points per hour. These examples show that the distance between the passing points and the average speed of trains bears such a fundamental relation to each other,

as will determine the number of trains per hour capacity between two given points. The application of this formula to a large number of single track operations demonstrates that the greatest capacity of single track is reached when the distance between passing tracks averages approximately 4.33 miles.

It has been found that when the distance is greater than this the capacity must be compensated for by increasing the speed, which in some instances may be excessive and at the expense of train tonnage, while on the other hand, if the distance averages less than 4.33 miles apart, the number of passing tracks will be excessive by virtue of the increase in the number of points where delays may occur.

If 2,000 is the average tons per train mile being hauled over the district, or if the district has assigned to it only one class of freight power, the rating of which is 2,000 tons, and the restricting section of the district is one having passing points 8 miles apart, and the grades are such that 10 miles an hour will be the maximum average speed of freight trains between these points, the capacity will be:

$$C = \frac{SW\ 24}{D} \div M = 10 \times 2000 \times 24 \div \frac{8}{1440} = 60000 \div 1440 = 41.6$$

tons per minute, which is the maximum tonnage capacity of the section without considering detentions of any character. From this tonnage handling capacity may be found the possible number of cars which can be moved, or the number of trains it is estimated can be run in a given unit of time by dividing the capacity by the average gross car weight to ascertain the former, and by dividing the capacity by the average tons per train mile to obtain the latter.

Thus far no consideration has been given to delays and detentions caused by opposing and following trains of superior class and direction. In practice passing points are not equally spaced, their distance apart being influenced by natural conditions, such as mountains, plains, and water courses, as well as the location of business centers, and for the purpose of facilitating the demonstration a section of track 100 miles in length will be chosen. If the freight trains are running at an average rate of 20 miles an hour with no detentions they will traverse the district in 5 hours. In order to make this time and pass trains at proper passing points without delay, it will be necessary to increase or reduce the speed in proportion to the distance between the passing points (this should be equal to the number of trains per hour both ways multiplied by the distance in miles between these points), or to re-space them. However, if this is found impracticable then such a readjustment must be had through grade revision or re-alinement.

In the example of our 100-mile district we will assume that there are 20 passing tracks, spaced as shown in the accompanying table; then by arriving at the maximum tonnage capacity between each two of these passing tracks by means of the formula previously described, it is found that section No. 14 is capable of handling less tonnage in a given unit of time than any other interval between passing tracks in the district. It therefore becomes the limiting capacity section, and the entire district will be limited in the movement of its through trains to the capacity of this section. This condition can be improved, however, either by shortening the distance between the passing points of the restricting section, thus reducing the time required to run from one to the other, or by re-alinement or reducing the grade so as to permit the train velocity to be increased to make the time interval between the two passing points equal to the same time as would be secured if the distance were lessened. Thus if we decrease the length of this restricting section of eight miles to six miles, with the same gradient, the capacity will then be increased from 66 tons per minute to 87 tons per minute. Or, in other words, the capacity of the entire district will be increased to this amount, provided, of course, there are no remaining sections of less capacity. If the gradient is reduced so that 10 miles an hour is obtained as the average train velocity, the capacity of this section will be also 87 tons per minute. However, in this specific problem this section will no longer be the restricting section as section No. 20 has only a maximum capacity of 74 tons per minute.

Greater efficiency in the operation of the district will be secured when the distance between the passing points and the elevations of the gradients are such as will permit of a more nearly constant interval of time for trains between the passing points. As there is not only a safe but an economical limit of speed, the volume of traffic in the final analysis is necessarily limited by the distance between passing points. It will appear from this that the nearer an undulating railroad is made to approach a level gradient, the fewer the passing points required, and the more regular becomes the train velocity. To ascertain the average distance between passing points which will result in the greatest efficiency for the rest of the district which is primarily limited by the previously mentioned restricting section, by transposing our formula, we have

$$D = \frac{SW\ 24}{C} = \frac{9.2 \times 2000 \times 24}{96000} = 4.6 \text{ miles}$$

apart for an ideal railroad having no detentions from opposing trains passing each other. It is, however, evident there must be delays in at least one direction when trains are operated in both directions on single track. These detentions must either be overcome by varying the speed of the trains, or by increasing the number of passing points. Having arrived at the ultimate capacity of the track, and found the value of one minute's time expressed in tons, one will be able to apply, for the purpose of illustration, the usual detentions occurring to train movements. The following conditions will be assumed: That the delay to trains taking the siding will be equal to 10 minutes, five minutes of which is for heading in and five minutes for pulling out. One half of this time should be charged to each of the trains meeting because in order to balance the power one half of the trains move in the opposite direction. Each train will then be charged with five minutes. In accordance with the standard code second and inferior class trains are not permitted to occupy the main line within 10 minutes of the time of following first-class trains or within five minutes of the meeting time of such trains. This is time absolutely lost to the freight train, and means that the tonnage-handling capacity of a district is reduced in proportion to the resulting detentions. It is fair to assume that each freight train will be passed by and will meet at least one passenger train during its trip over the district, thus delaying it the amount of these clearance times. To these detentions should also be added several minor delays suffered by each train, such as taking coal and water and getting orders. This will probably amount to 40 minutes per train in traversing the 100 miles, which when equally proportioned to each of the 20 passing tracks, will be approximately two minutes. As the running time through the restricting district is 30 min., the total average estimated operating time required by freight trains to traverse this section equals the sum of these delays, which are tabulated thus:

Operating Capacity of Single Track

D = Distance between passing tracks in miles.	2	5	3	5	6	6	5	3	4	5	7	2	5	8	3	7	4	6	5	9
S = Speed m. p. h.	8	20	12	20	20	20	20	12	20	16	25	24	20	16	12	25	16	24	18	20
C = Capacity in 1,000 tons per 24 hours	192	192	192	192	160	160	192	192	240	153	171	576	192	96	192	171	192	192	192	106
c = Capacity in tons per minute	133	133	133	133	101	101	133	133	166	106	118	400	133	66	133	118	133	133	133	74
Section reference numbers	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20

	Min.
Observance of clearance rule for following movements	10
Observance of clearance rule for meeting trains	5
Time required taking siding	5
Miscellaneous delays, train orders, etc	2
Running time over restricting section	30
Total operating time, freight trains	52

As previously ascertained, 66 tons a minute or 96,000 tons each 24 hours is the ultimate capacity of the limiting section, without delays. We now find that in actual operation there will be practically 22 minutes of normal standing time. This added to the running time of 30 minutes aggregates 52 minutes which is the total operating time required by freight trains to pass over this territory. The normal operating capacity of the entire district then becomes $C = \frac{9.2 \times 2000 \times 24}{8} = 55{,}200$ tons per 24 hours, when the movements of trains are controlled by the train order system, which necessitates the observance of the 10 minute clearance rule for following movements. If the absolute permissive block system is substituted for the train order system and this 10 minutes is regained, then the capacity of the district will be increased to $C = \frac{11.4 \times 2000 \times 24}{8} = 68{,}400$ tons per 24 hours. Then tabulating the various elements of time as above stated on a percentage basis we find that through the restricting district the relative values are as follows:

	Per cent.
Observance of clearance rule following movements	19.2
Observance of clearance rule meeting trains	9.6
Time required taking siding	9.6
Miscellaneous delays, train orders, etc	3.8
Running time over restricting section	57.8
	100.0

From this it is seen that 19.2 per cent. of the time required to traverse the limiting section is consumed in observance of the clearance rule for following movements. This is a factor in operation that can be overcome by resorting to some other method of train control than by train orders. It is observed that nearly 58 per cent. of the time used is for actual running time, which means that this speed is 16 miles an hour, as the passing tracks are 8 miles apart. If this could be increased by a slight grade revision or realinement to possibly 20 miles an hour, the running time required would be reduced from 30 minutes to 24 minutes or a saving of 6 minutes secured. Thus by these two changes the total time could be reduced from 52 minutes to 36 minutes, or the final operating capacity of this section increased from 68,400 tons per 24 hours to 79,200 tons, or assuming that the average gross weight of cars is 40 tons, then the capacity expressed in number of cars will be 1,980 per 24 hours for the through movement over the entire district. Under the improved conditions the standing time detentions for freight trains at each of the passing tracks will approximate 12 minutes, and as there are 20 passing points, the approximate total standing time will be 20 times 12 minutes or four hours, which must be added to the total average running time between all of the passing points. In this instance the average running time is 20 miles an hour, and as the length of the district is 100 miles it requires 5 hours to traverse the district, without any detention. Adding to this the detentions of four hours, the total operating time required to pass over the district will be nine hours, or an average speed of 11.1 miles an hour. As the capacity has been found to be 79,200 tons per 24 hours, the capacity per minute will be 55 tons, or in other words, any condition which will retard the movement of trains through the restricting section one minute will reduce the capacity of the entire district 55 tons. Therefore, the introduction of one passenger train, which we will assume is running at an average speed of 30 miles an hour, will reduce the capacity of the district by 2,090 tons; for the passenger train, occupying the main line of the restricting section 16 minutes (this being time required to run 8 miles at 30 miles an hour), will delay the freight trains at one of the passing points of the restricting district 22 minutes when movements are controlled by the train order system, making a total detention to freight traffic moving through this section of 38 minutes, which at 55 tons a minute, equals 2,090 tons. If, however, the territory is operated under the absolute permissive block system, it will reduce the capacity only 1,540 tons, for under this system the passenger train will delay the freight traffic 28 minutes instead of 38 minutes, because practically all of the 10 minutes clearance for following movement is obtained. When there are 10 passenger trains operated each day, five each way, under the block system, the maximum handling capacity of the railroad will be 63,800 tons per 24 hours, or 1,595 cars of 40 tons gross weight each, whereas under train order system the capacity will be 58,300 tons or 1,457 cars per 24 hours. While this maximum capacity may never be attained in practice, nevertheless it expresses the ultimate tonnage which can be handled and the more nearly it is approached the greater will be the efficiency of operation.

Running trains in fleets does not increase the capacity of a single track railroad operated under the train order system, however much the plan may be advisable for other reasons, for it is necessary to maintain a safe operating distance between trains, and the time lost to rear sections by waiting for the forward sections to proceed, or "get in to clear" will equal if not exceed the time required to run one train over the entire district. The capacity of a single track railroad is directly affected by the number of detentions and the length of detentions with a given number of passing points, or for a given capacity, the more the detentions, the greater the number of passing points required.

The yard capacity of the district terminal should in no case be less than one half the total capacity of the single track railroad both ways, in addition to the space necessary for handling industries. This means that the district terminal should have a capacity equal to the inbound tonnage multiplied by the average time required to break up inbound trains and to reassemble the cars into outbound trains. Generally speaking, many of the restricting sections of single track territory exist between the district terminal and the first station out from it.

By analyzing a territory in this manner, it is possible to determine the relative value of the different operating elements and decide which needs improvement first, as well as the proper apportionment of mileage to units of supervision. It may be found possible in many instances by improving certain conditions of passing track spacing, by making grade revisions and realinements and knowing the possible annual tonnage increase, to make adjustments that will obviate the necessity of building the second track for a number of years to come. The building of the second track, however, should not be delayed beyond the time when the detentions—due to the passing of trains by means of passing tracks—equal the time required to run between the passing points.

THE RATE ADVANCE HEARINGS

The Interstate Commerce Commission, in a circular dated April 13, announces that all briefs touching on the issues involved in the two cases which are before it, "Revenues of Rail Carriers in Official Classification Territory" and "Rate Increases in Official Classification Territory," must be filed on April 27. The argument which is to be begun on that day will embrace all the questions presented on the record. The circular says:

"That part of the record that deals with the financial condition and requirements of the carriers and with the rate schedules under suspension in the proceeding is now closed except as to such exhibits as have been requested of record and except as to the replies from the carriers to the questions touching their financial condition and requirements submitted by the commission in its circular letter of December 20, 1913. It will be understood, however, that the record will not be closed as to the related matters involved in the inquiry instituted by the commission until the replies of the carriers on those questions, submitted by the commission in its circular letters of December 20, 1913, and February 26, 1914, have been filed, the investigations by the commission in connection therewith, now approaching completion, have been placed on record, and until the hearings, now in contemplation, upon these last mentioned matters, have been had."

A circular letter under the same date, signed by W. J. Meyers, postponed the hearing set for April 27, on the proposed requirement that railroads be required to analyze currently their operating expenses with respect to freight and passenger service and report periodically the results to the commission, to May 2, 1914.

Philadelphia & Reading 4-4-0 Type Locomotive

Designed for Comparatively Light Trains on Difficult Schedules; Has Superheater and Power Reverse Gear

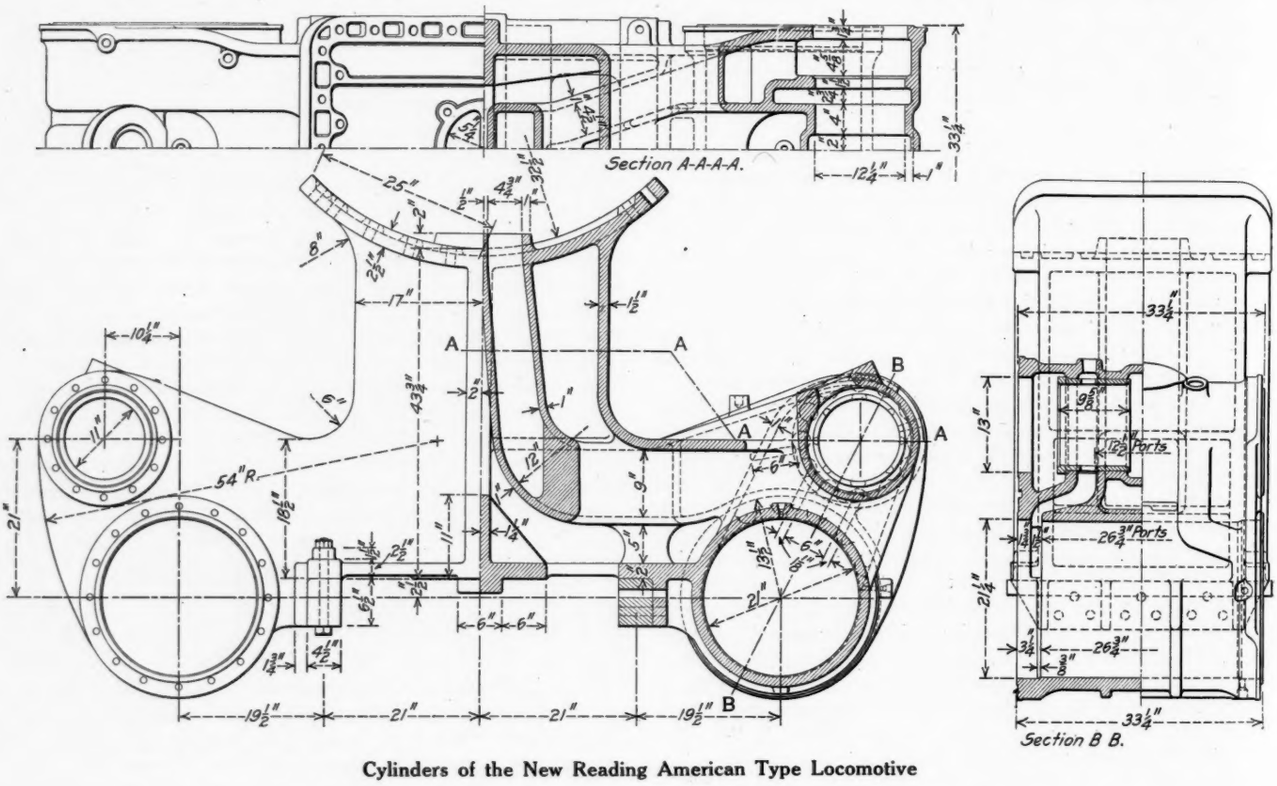
The Philadelphia & Reading has a great deal of local and suburban traffic, and also of express traffic on comparatively short divisions, where train loads are not excessive, but schedules are most exacting. The greater part of this service is performed by four-coupled locomotives. On the New York and Seashore lines, where very high speeds must be maintained, Atlantic type locomotives are used; but a large part of the express traffic on other parts of the system is handled by locomotives of the American, or 4-4-0 type. On this road, where anthracite is the fuel generally used in passenger service, the need for trailing-wheel locomotives is not as great as on lines where bituminous or high-volatile coal is burned. Firebox depth when using anthracite, is relatively unimportant, and a wide grate can therefore be placed above large driving wheels without raising the boiler to an excessive height.

The Baldwin Locomotive Works has recently supplied the Reading with ten American type locomotives, which represent the latest development of an interesting series of engines of this type. The following table gives the comparative dimensions of American type locomotives built for this road since 1883:

Date.	Cylinders, in.	Drivers, diam., in.	Steam pressure, lb.	Grate area, sq. ft.	Heating surface, sq. ft.	Superheating surface, sq. ft.	Weight on drivers, lb.	Weight, total engine, lb.	Tractive effort, lb.
1883	18½ x 22	61⅝	140	68	1,014	...	62,865	93,105	14,600
1889	21 x 22	68½	160	76	1,325	...	69,540	105,470	19,250
1901	21 x 22	68½	200	76	1,942	...	87,680	132,680	24,000
1914	21 x 24	68½	210	86	1,517	257	120,528	173,490	27,850

The new locomotives were built in accordance with drawings and specifications furnished by the railway company. Strict weight limitations were imposed, and the design was carefully worked out in order to secure the maximum hauling and steaming capacity without over-running the specified loads. The result is a locomotive which is well adapted to heavy local or express traffic, on divisions having moderate grades, and where train loads are within the capacity of an engine of this type.

The boiler has a Wooten firebox, with a combustion chamber 33 in. long. The center line of the barrel is 9 ft. 7 in. above the rail, which is sufficient to keep the grates well above the driving wheels, and provide room for a conveniently designed ash pan, with liberal draft openings under the mud ring. The first boiler ring is conical, increasing the shell diameter from 62 in. to 70 in. This arrangement permits a satisfactory distribution of tubes in the front tube sheet, without cramping the



Cylinders of the New Reading American Type Locomotive

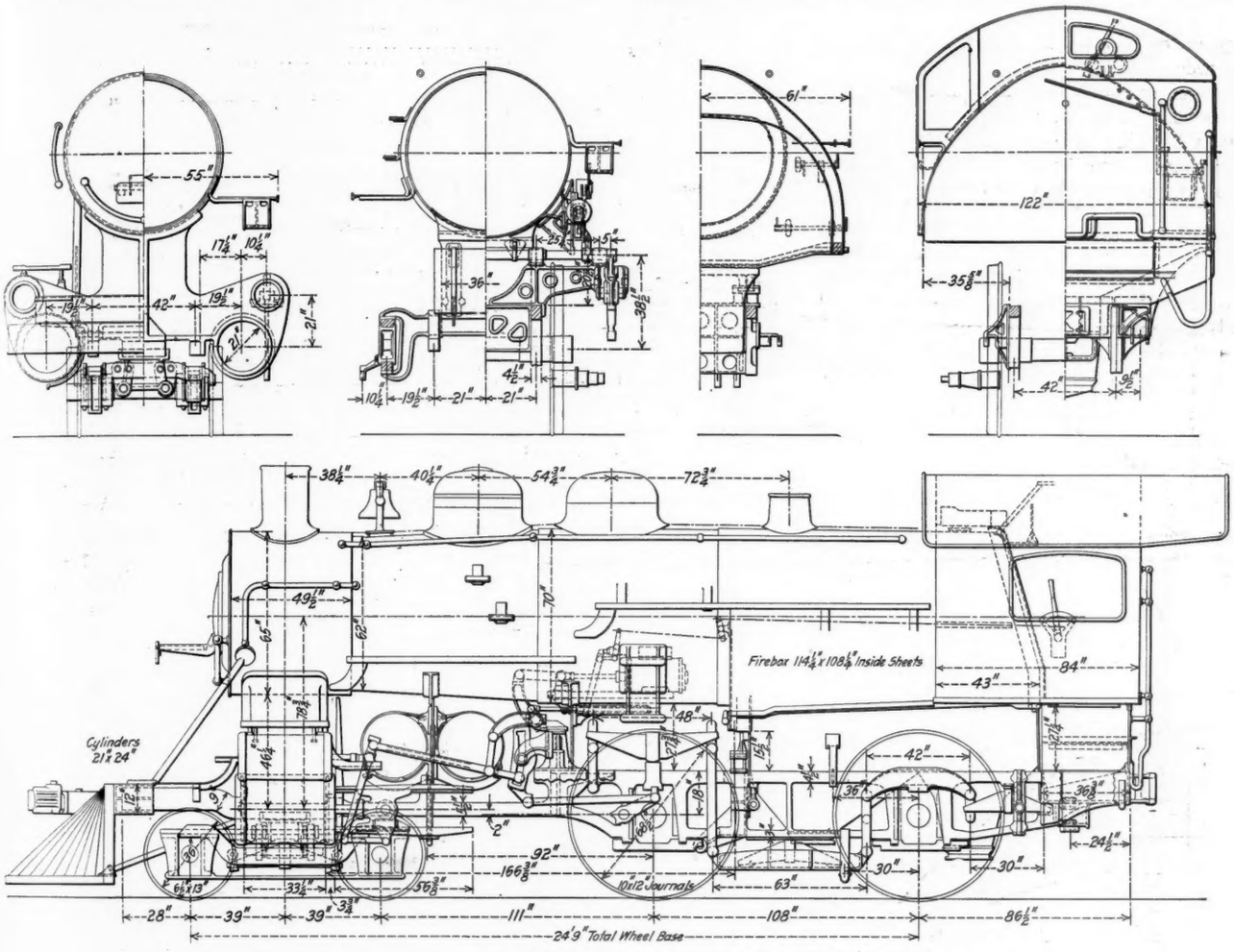
water space under the combustion chamber. There are two fire doors, each 13 in. by 18 in., with their centers 30 in. apart. A brick wall is built across the throat of the combustion chamber, and the grate is of the rocking type.

A Schmidt superheater, with 22 elements, is employed, and steam is delivered to the steam chests through outside pipes. The distribution is controlled by 11 in. piston valves which have a steam lap of 1¼ in., and an exhaust clearance of ¼ in. These valves are driven by Walschaert gear, and have a maximum travel of 7 in. in forward motion and a constant lead of ¼ in. Special attention has been given to the machinery and running gear. The valve motion details are of open-hearth, oil-treated steel, and are as light as is consistent with the required strength. The piston rods and crank pins are of Nykrome steel, the latter being hollow-bored. The driving axles are of open-hearth, forged steel, and are also hollow bored. Reversing is controlled by the Ragonnet power mechanism, the gear being supported on the right hand side of the boiler just forward of the firebox. This is a particularly convenient arrangement in this case, as

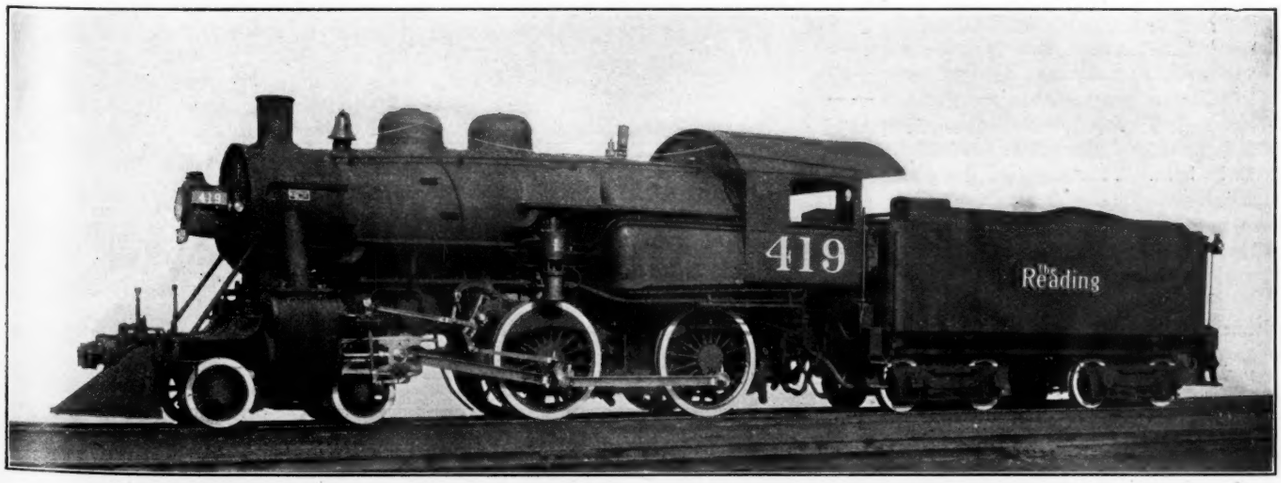
the cab is placed at the back end, instead of over the middle of the boiler, and it would be difficult to install a reverse lever of the usual type on account of the exceptionally wide firebox.

The frames are of open hearth steel, 4½ in. wide, each cast in one piece with a single front rail. The upper and lower frame sections combine to form the single rail just ahead of the leading driving wheels, and at this point is placed a strong transverse brace of cast steel. The brackets which support the link and reverse shaft bearings are seated on this brace, and are securely bolted to it and to the frames. A strong transverse brace is also placed under the front end of the firebox, while the guide yoke constitutes a cross tie for the front frame rails. The yoke and guide bearers are combined in a single casting, and this is bolted to knees which are cast in one piece with the frames. The guide yoke is braced to the boiler by an expansion plate, which serves as a support for two air drums having a combined capacity of 40,000 cu. in.

The equalization system is arranged with three half-elliptic



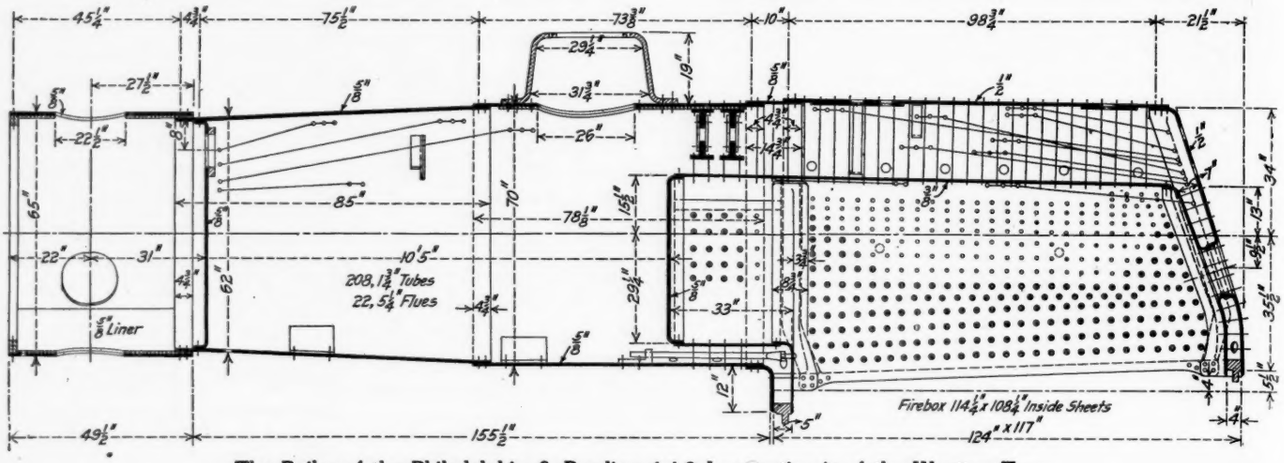
General Arrangement of the Philadelphia & Reading 4-4-0 Type Locomotive



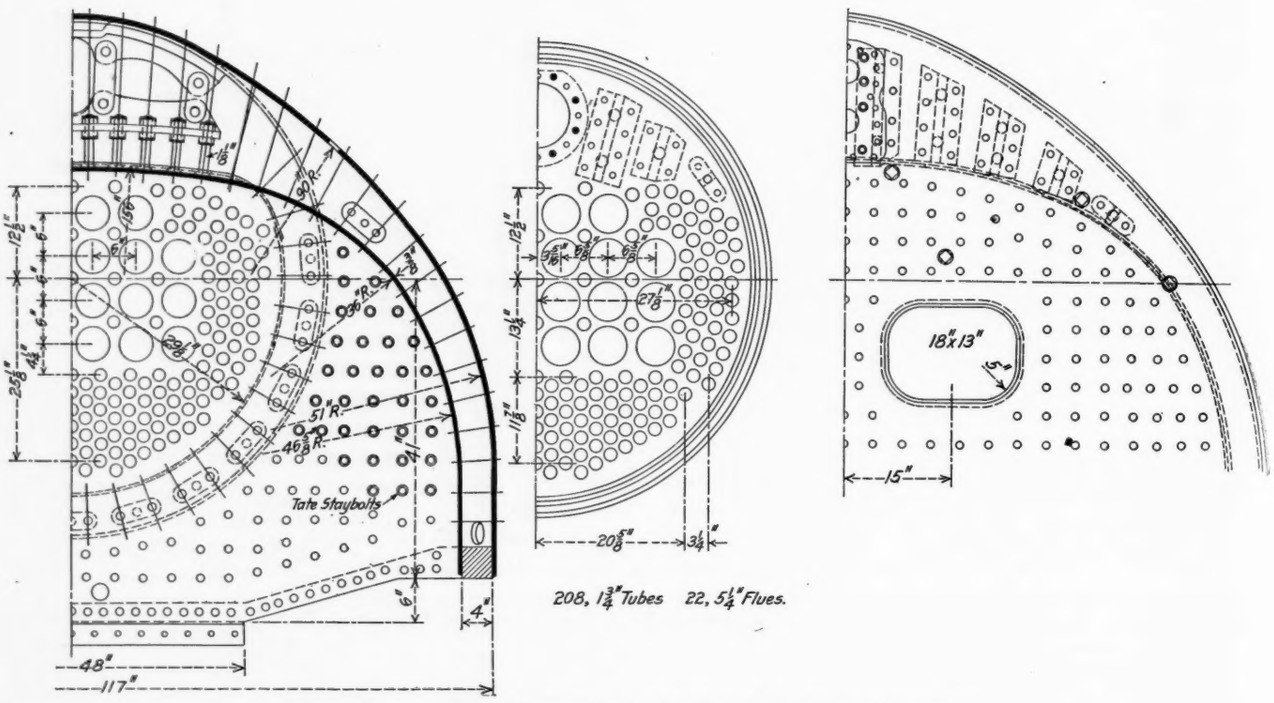
American Type Locomotive Recently Placed in Service on the Philadelphia & Reading

springs on each side. One of these is placed behind the rear frame pedestals, and is connected to yokes which are supported on the rear driving boxes. This arrangement of spring rigging provides easy riding qualities.

This is a highly developed locomotive of its type, and while it is of unusual capacity for a 4-4-0 type engine, the wheel loads are not as great as those carried by many other locomotives



The Boiler of the Philadelphia & Reading 4-4-0 Locomotive is of the Wootten Type



Cross Sections of the Wootten Boiler Used on the Reading Locomotive

recently built. This suggests the possibility that the ultimate capacity attainable with this wheel arrangement has not yet been reached.

The following are the principal dimensions and data:

General Data

Gage	4 ft. 8½ in.
Service	Passenger
Fuel	Anthracite
Tractive effort	27,850 lb.
Weight in working order	173,490 lb.
Weight on drivers	120,530 lb.
Weight on leading truck	52,960 lb.
Weight of engine and tender in working order	320,000 lb.
Wheel base, driving	9 ft. 0 in.
Wheel base, engine and tender	56 ft. 11⅜ in.

Ratios

Weight on drivers ÷ tractive effort	4.32
Total weight ÷ tractive effort	6.23
Tractive effort × diam. drivers ÷ equivalent heating surface*	1,003.
Total equivalent heating surface ÷ grate area	22.10
Firebox heating surface ÷ total saturated heating surface, per cent	11.70
Weight on drivers ÷ total equivalent heating surface*	63.40
Total weight ÷ total equivalent heating surface*	91.30

Cylinders

Kind	Simple
Diameter and stroke	21 in. x 24 in.

Valves

Kind	Piston
Diameter	11 in.
Greatest travel	7 in.
Steam lap	1¼ in.
Exhaust clearance	¼ in.
Lead	¼ in. constant

Wheels

Driving, diameter over tires	68½ in.
Driving journals, main	10 in. x 12 in.
Driving journals, others	10 in. x 12 in.
Engine truck wheels, diameter	36 in.
Engine truck journals	6½ in. x 13 in.

Boiler

Style	Wooten
Steam pressure	210 lb.
Outside diameter of first ring	62 in.
Firebox, length and width	114¼ x 108¼ in.
Firebox plates, thickness	⅜ in.

Firebox, water space	F., 5 in.; S. & B., 4 in.
Tubes, number and outside diameter	208—1¾ in.
Flues, number and outside diameter	22—5¼ in.
Tubes, length	10 ft. 5 in.
Heating surface, tubes	1,297 sq. ft.
Heating surface, combustion chamber	42 sq. ft.
Heating surface, firebox	178 sq. ft.
Heating surface, total evaporating	1,517 sq. ft.
Superheater heating surface	257 sq. ft.
Total equivalent heating surface*	1,902 sq. ft.
Grate area	86 sq. ft.

Tender

Wheels, diameter	36 in.
Journals, diameter and length	5¾ in. x 10½ in.
Water capacity	7,000 gallons
Coal capacity	10½ tons

* Equivalent heating surface = evaporative heating surface + 1½ times superheater heating surface.

STARVE THE RAILROADS AND WE STARVE OURSELVES*

BY FRANK A. MUNSEY

The railroads are structurally a part of our national life—fiber of our fiber. They are the arteries of our very being through which courses the life-blood of the nation. We cannot do them harm without doing ourselves harm. Starve them and the pinch of poverty grips us.

The railroads were built by private capital and are owned by private capital, and yet they have little of the inherent freedom of private property. Their charters constitute them common carriers, public service concerns, and as such they are in a sense owned in common by the public and by private capital—no actual public ownership in them, dollars and cents ownership, but in the outworking the "senior partner" influence and dominancy of the public makes it amount to about the same thing.

Such a partnership between the public and private capital, the latter putting up all the money and taking all the risks, is a soft thing for the government, arrogating to itself, as it does, absolute control. Of course, it wasn't this way when railroads were built, when capital risked itself in these venturesome undertakings. If it had been—if the government's attitude towards railroads had been just what it is now, the same narrow picayune policy in force—we should have no railroads today except government built and government owned.

Private capital in any measure worth while would never have gone into the upbuilding of railroads, knowing in the outset the extent to which it would be fettered and hampered and harassed, as it knows it now.

I have no fault to find with government control as such. It is the kind of government control we have, with which I am finding fault. As a matter of fact, there is nothing else fro us but government control or outright government ownership.

With strong, able, wise government control—a kind of control that embodies constructive co-operation with railroads—we should have a far better railroad service than we could well hope for from government owned and government operated railroads. I don't believe there is any doubt about this.

Though capital went into railroad construction with the idea that railroads were private property, the change that has come about, putting them so completely under government control, was inevitable. Neither the government nor capital foresaw this change in the early days of railroad development. Indeed, it was the very vastness of this development and the incomparable power railroads had come to be that compelled public control and gave rise to the present conception of the proper relations of the railroad, common carrier that it is, to the public.

The government, therefore, cannot be charged with luring capital into railroads under former railroad freedom with the knowledge that this freedom later on would be taken away from them. Until within a little more than a decade ago there was no serious conflict of opinion between the government and the railroads.

At the outset no one ever dreamed of the power the railroad has come to be and the part it plays in our daily lives, to say nothing of its inconceivable contribution to the opening up and development of the country.

It follows naturally that changes in our laws must be made suited to this new development--a development so vast in its power that, unchecked and uncontrolled, it would in time contest for the mastery with the very government itself.

So government control had to come, but in the exercise of its control it has frightfully crippled and maimed the entire railroad business of the country. Capital has lost heart and would get out if it could do so without too great a sacrifice. Dividends on railroad shares have dwindled until they have no appeal to fresh capital. The government stakes out the lines within which capital must work, fixes its rates of income, and then says to capital, "Give us the best railroad service in the world."

All this would be well enough if the government's conditions were such as to make this possible, which is not the case. The fact is the railroads cannot give us the service we demand, pay the wages and taxes they are paying, and live on the income to which the government is grudgingly holding them down.

But the chaotic condition of the railroad business is only a little worse than that of business generally throughout the country. There is no snap and go to anything, and everything is in a blue funk. In view of these conditions, what are our chances of having good times? We hear the question all the while. It is on everybody's lips. The answer is vital. It affects our entire population, one hundred million human souls. No one is beyond the sphere of its influence. Our expenditures, our incomes, the scope of our undertakings, the scale of our living—our necessities, our comforts, our pleasures, our luxuries, our savings, and our very future—all depend upon it.

We are a temperamental, impressionable people. When we have good times we hurl ourselves on enterprise and sweep everything before us. When we have hard times and feel the pinch of poverty and see idle cars, idle factories, and idle labor, we get a fit of the blues which makes us distrust our institutions, distrust ourselves and look upon life as one weary grind.

We have wallowed in the slough of despond since the beginning of 1910, and today our securities, battered and tattered, find little favor with European investors. Every enterprise has felt the lack of confidence, the lack of courage, and has perforce squared itself to that grim, ill-shapen thing—the thin pocketbook.

But human nature, and particularly American human nature, cannot be kept down forever. We have had enough of the valley, with its fogs and chills, and want to get away from it all and once more look out on the world from the sun-swept heights. And, too, we want to hear the old, old story of what a wonderful country we have, of the vastness of our resources, the colossal measure of our undertakings, the bulging of values and the song of opulence and wealth and riches—enthralling music to our ears.

Starving the railroads and hostility to capital are responsible for our business depression and industrial stagnation. The government has overplayed its hand in humiliating capital and breaking up our big enterprises. Its obvious worry lest somebody, somewhere, somehow, might make a dollar has been overdone. Continue the policy of starving the railroads and we shall continue to starve ourselves, and shall have no good times. Let the railroads make a decent living, and the wheels of enterprise will leap into activity.

I am not writing as a pessimist. I am an optimist through and through, but optimism must take cognizance of facts. And what are the facts on which to base the hope for business activity, with our new low tariff, unless we get a *gigantic impetus* from some source or other?

Agriculture cannot bring it about; war is not likely to bring it about; our new tariff is certain not to bring it about; the iron and steel trade cannot bring it about; the textile manufactories cannot bring it about; mining in all its different phases cannot bring it about; and all the scattered, smaller manufactories cannot bring it about.

It may well be doubted if anything can bring it about, as matters stand today, except the railroads, and the railroads can bring

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it about if they are allowed freight rates and passenger rates that will enable them to do business at a rational and fair profit—such a profit as will give place and value to their securities in the markets of the world.

This is what we want at this juncture to give us good times, temporary good times at least, and good times for a long run, if the policies of the government with regard to business, the tariff, the currency and in other respects are right. If these are not right it is pretty safe to assume that we, as a people, have the good sense and the patriotism, irrespective of politics and politicians, to make them right.

But just why can't agriculture give this impetus to business, and why is it that railroads alone can give this impetus to business? Briefly, the answer is this: Agriculture is a producing and selling industry. If we were growing a vast surplus beyond our own requirements and could sell it abroad, the new money flowing across the ocean would give us the impetus we need. But unfortunately we have no such surplus and are not likely to have.

The steel and iron industry, vast as it is, in the aggregate, and well concentrated as it is, cannot in and of itself revitalize business. Like farming, it is a producing and selling industry. This is equally true of the countless scattered enterprises of one kind and another. Merchandizing doesn't even produce anything. It has to do merely with barter and sale. Banking, likewise, produces nothing. It is parasitic in its very nature.

The railroad, unlike these other enterprises, has nothing to sell but service. It buys, buys, buys, and all the while buys. It is a purchasing and consuming business, which ranks next to farming in its vast scope. The wages of railroad employees have so far increased that now they call for practically one-half of the gross receipts of railroads. The sum total paid out to labor by the American railroads is greater than that paid to labor by any other enterprise in any country of all the world. The railroads hold the key to the present business situation. Give them a chance and they will set the wheels of industry going. But they can do nothing for business and nothing for themselves impoverished and starved as they are by the government.

With a chance to live and to earn enough to make their securities safe and attractive to investors the world over, they could sell them like a shot.

What we need and must have at this juncture is new money and lots of it. The railroads alone can find this new money. But it is up to the government to decide whether they shall find it or not. So far the government in its non-constructive or, if you will, destructive policy has refused the railroads a chance for their lives.

If the government would get back of the railroads and give them a lift, the railroads would get back of business from one end of this country to the other and give it a lift—would get its great broad shoulder under business and heave it into action. Assure investors that our railroads have back of them the great American people, the good feeling and spirit of co-operation of the American people, and have back of them as well the strong, helpful hand of the government, untold money would flow into this country from abroad and vast sums of sleepy money tucked away in odd places here at home would straightway come out of its hiding and go into railway securities.

And what wouldn't this money mean to us—all this vast aggregate of new money in the coffers of the railroads to be spent for labor, for betterment, and for new undertakings? The railroads must have new rails, new cars, new engines, new ties, new bridges, new stations, better roadbeds and a thousand other things. They must add to their sidings, double their trackage, and extend their roads into new territory. All this means work for idle men and full envelopes on Saturday nights.

Indeed, the railroads would begin buying on so tremendous a scale that our steel mills and other concerns having to do directly and indirectly with railroad supplies would be taxed to their capacity and beyond their capacity. And the high pressure activity in these lines would electrify the whole country and set every spindle spinning and every wheel of industry bounding into action. And there would be no idle men, no idle cars, no shuttered factories, no depression, no blues. Activity and enterprise and achievement would grip the country from ocean to ocean and from the gulf to the northern border.

This is not an idle fancy. It is the very thing that would happen, and such a happening is the very thing we all want. And if we all want it, why shouldn't we have it? We are the government; the government is the thing of our creation, the servant to do our bidding.

The question, then, is this: shall we give the railroads a square deal, or shall we continue to punish them for the sins of a former period, when the relations of railroads to the public were not understood as they are now? In the old days people held to the idea as a matter of course that railroads, owned by private capital, were private property. We didn't know much about public service concerns then. We accepted the theory as a matter of course that the biggest shippers should get the lowest rates. Wholesalers bought at lower prices than retailers, so why not wholesale rates to big shippers?

But once the public service conception was fixed in our minds we saw the railroads in an entirely different light. Naturally railroad managements fought for the independence they had always had, and doubtless fought honestly, influenced by their interests. But all this has changed now. Ten years of discussion has brought capitalists and public, the fair-minded men among each, to a common understanding of the relations of capital to the people, of trusts to the people, of the railroads to the people, and of the relation of telegraph, telephone and all other common carriers to the people.

We ought to have, and I am satisfied that the American people demand, the best and safest railroads in the world. It is a certainty that we cannot have them without paying the price—railroads with every new device, every improvement that means safety and better service. And we can well afford to pay the price when the failure to do so means inferior railroads, dangerous railroads.

Forcing railroad managements into a position where they have been compelled to squeeze paltry dividends out of half-fed, half-nourished properties that they might keep their roads out of bankruptcy is a rotten policy.

Legitimate economies are fundamentally necessary to honest, able management, and whatever the government has accomplished in the way of cutting out waste and introducing first rate standards of economy is, of course, very much worth while. But to starve railroads into other economies, such, for instance, as skimping on roadbeds, skimping on bridges, skimping on rails, skimping on rolling stock, skimping on safety devices, and skimping all along the line, is quite another matter. They are costly savings to the people, dearly bought savings.

I hold no brief for the railroads; I am not speaking for myself as I hold no railroad stocks, and don't wish to hold any under present conditions. Neither am I speaking for those who do hold railroad stocks. I am speaking for idle men, speaking in the interest of better business, speaking for a square deal for the railroads, for safe railroads, sound railroads.

For the government to stand back of railway labor, morally sustaining it in its demands, for shorter hours and better wages, as the government has done, at the same time denying railroads the right to increase their incomes sufficiently to meet the increased cost of operation is of the nature of confiscation, and no honest citizen of this country believes in any such thing or would himself, with full realization of the facts, be a party to it.

Let us have peace. Let this bitterness against the railroads cease. There is nothing in all this warfare for you or for me. Give the railroads a chance to prosper and we prosper with them; starve them and we starve with them.

WIDENING THE WARSAW-VIENNA RAILWAY.—It is reported that a special commission of engineers has been appointed to draw up a scheme for the conversion of the narrow gage line of the Warsaw-Vienna line into a standard gage line.

Extensive Reduction in Canadian Rates Ordered

Decision of Railway Commission in Western Rate Case. Higher Rates in West Than East Justified

As briefly noted in last week's issue, the Board of Railway Commissioners for Canada on April 7 rendered a decision in the case involving rates in western Canada, ordering extensive reductions in many rates estimated to range from 5 to 30 per cent. The case had been before the board since December, 1910, and was made the subject of a general investigation, in the course of which 62 hearings were held, occupying 100 days. The board has issued a summary of its judgment of which the following is an abstract:

The first step leading up to the inquiry was the resolution of the Winnipeg Board of Trade on November 14, 1911. This resolution was forwarded to the government, and the matter was referred to the board for such action as it deemed proper. There was at the same time pending a complaint of the Vancouver Board of Trade that the existing rates from eastern points on a western movement were discriminatory as compared with rates from Vancouver on an eastern movement. The Vancouver Board of Trade complaint being bound up with and affecting the question of western rates, was joined in the board's order of February 15, 1912, with the general investigation of rates in the provinces of Manitoba, Saskatchewan and Alberta, and in the province of Ontario west of and including Port Arthur, which had been provided for in its order of January 8, 1912.

It is unfortunate that an issue has been made between the East and the West. Cash payments or credits from the East in aid of railway development do not justify higher rates in the West. The opening up of the West by railway construction is of value to the East. The lower the rates in the West, the greater the extension of eastern business therein. The lower the rates in the East, the lower is the rate charge on which western goods find their way into the world's market.

It is contended that the existing rates in the East are made possible by excessive rates in the West. An analysis of this points out that the Canadian Pacific first commenced its operation in the West; that its main line was opened on May 26, 1887; and that when it commenced its operation east of Fort William, it simply adopted the rates charged by other railways in that territory, and the rates so adopted were not affected in any way by the rates west of Fort William. No voluntary benefaction by way of reduction of rates was made to the people in the East at the expense of the people in the West.

In an attempt to ascertain whether the existing rate structure was inordinately profitable, the earnings of the Canadian Pacific were apportioned between its operating divisions on the basis of the mileage contained therein. It is recognized that in so dividing revenues between the eight operating divisions of the Canadian Pacific, results are arrived at which are not characteristic. For example, the Lake Superior division which originates or terminates practically no traffic, is shown with a large proportion of revenue. The railway operating divisions are not the proper basis for distribution of revenues, because, for example, the provincial boundaries of Saskatchewan and the boundaries of the railway operating division of Saskatchewan are not the same.

DISCRIMINATION NOT ALWAYS UNDUE

The Railway Act does not forbid all discriminations and preferences; it forbids an unjust discrimination or an undue preference. The board has recognized in various decisions that the question whether discrimination is unjust or a preference undue is a matter of the particular facts of a particular case. Examples are cited. Group rates, while they have some elements of discrimination, are in the public interest so long as the discrimination is not unjust. Water competition has been recognized as a factor affecting rates. The board has held that it is in the discretion of the railway whether it shall or shall not make rates to meet the competition of markets. A similar position has been taken by the English Railway & Canal Commission. The board has recognized that a division of the through rate is not a necessary measure of the reasonableness of the local rate. Special rates, such as those contained in town tariffs and commodity rates, result in some discrimination. The commodity tariffs, under which the large bulk of the country's merchandise moves, work a two-fold discrimination. In the first instance, a discrimination in favor of shippers of a particular class of merchandise from points where the volume moving justifies commodity rates as against shippers of the same commodity at points where no commodity rates exist; and, secondly, a discrimination in favor of an article carried at the commodity rates as against articles of a kindred nature which might come more or less into competition with an article moving under a commodity rate. But the low commodity rate basis works to the advantage not only of the shipper but also of the consumer.

FACTORS AFFECTING EASTERN RATES

It being recognized that the rates west of Fort William are higher than those east, the question of the factors affecting eastern rates has to be considered. In the territory extending from Windsor and Sarnia to eastern ocean ports, there is real and effective railway competition of American lines. This competition was recognized by the board in the International Rate Case. Water competition is effective throughout eastern Canada as far as Port Arthur and Fort William. The low rate basis brought about by the lake transportation facilitates the movement of commodities into and out of the West. Counsel for the provinces of Saskatchewan and Alberta recognized the existence of water competition at certain points, but disputed its efficiency at points some distance more remote from the railway. He recognized that the water competition might either be actual or potential, and that the water rate may hold down the combined lake and rail rate. It may be pointed out that the rate from the East to Winnipeg is influenced to a considerable extent by the water rates to the head of the lakes.

The Atlantic division of the Canadian Pacific is shown by the returns to be unprofitable. The rates in the maritime provinces are low, not only as a result of water competition, but also as a result of the Intercolonial rates, a road whose operations have largely resulted in deficits. The earnings of this division on the mileage basis are also held down by the fact that a large part of the business is through business carried on a low rate. In the case of a grain movement from Regina to St. John on a through rate, the Atlantic division may be apportioned a part of the through rate proportioned to the mileage moved by it within this division. If the basis of the rates on western products to St. John were applied to the local traffic of the Atlantic division the local rates would be very greatly depressed. From Woodstock, N. B., to St. John, for instance, the company would receive on a grain or flour shipment on the Regina basis only one-sixth the local tariff rate. The through rates keep down the average earnings. The Atlantic division is in reality to be regarded as a terminal. The result is that the western provinces, producing as they do grain and flour, and interested as they are in a cheap furtherance rate, not only from their own borders but also to the seaboard, instead of being injured participate in the benefits of the low through rates on grain and flour passing through this division.

By far the greater part of railway business in eastern Canada is on the line of water competition. The rate basis in east-

ern Canada, both adjacent to and more remote from the waterways, was established by the railways at a time when there was no regulation of rates. The rate basis they put in was affected both by water and by American rail competition. No evidence has been submitted by any of the complainants negativing the force either of water or of railway competition in the East, or the resultant effect of such competition.

HIGHER WESTERN RATES JUSTIFIED

The board is of opinion that while discrimination exists between the rates charged east and west of Port Arthur, the discrimination is justified under the Railway Act and the decisions of the board; that is to say, it is not an unjust discrimination or an undue preference. In the main, the rate structure of eastern Canada is justified on the basis of water and railway competition. There may be some points where discrimination which cannot be justified by competitive reasons exists. It may be that in connection with these there would be justification for increase of rates. The rates in eastern Canada may be low, perhaps, at certain points, too low, even in view of its geographical advantages. It cannot fairly be said, however, that these low rates are in any manner the result of excessive western rates. They are practically the rates which applied long before the profits of western railway operations had anything to do with Canadian railway resources.

MILEAGE IN WESTERN CANADA INADEQUATE

The existing railway mileage in western Canada is inadequate, at least so far as Saskatchewan and Alberta are concerned. To ascertain to what extent the existing railway mileage meets the needs of western Canada, calculations have been made to show how much acreage in these provinces is more than 10 miles from the railway. Complaints made to the board by farmers in the West show that, on the average, a 10-mile haul enables the farmer, where there are fair roads, to market his grain and return home in one day. Railways laid out, having in view a maximum 10-mile haul, would not be constructed nearer to each other through the farming territory than 20 miles. On this computation, the railways existing in Saskatchewan serve 70,000 square miles, or 44,000,000 acres on the basis of the 10-mile haul. South of Township 58, there is an area of 121,000 square miles, or 77,000,000 acres, thus leaving 51,000 square miles or 32,000,000 acres yet to be served. Railways which may be constructed under the guarantees of the province outstanding last year when completed would provide facilities for 17,000,000 additional acres. This would leave, in the territory south of Township 58, 39 per cent. of the total acreage further than 10 miles from the railway.

In Alberta, within the boundaries formed by the 74th Township and the 10th Range of the west meridian, there are about 85,000,000 acres. In this acreage, existing railway lines serve 26,000,000 acres, on the basis of the 10-mile haul, leaving over 58,000,000 acres yet unserved. Railways proposed to be constructed under the guarantees of the provincial government and outstanding last year will provide for about 17,000,000 of acres more, leaving 48 per cent. of the territory so referred to further than 10 miles, at least, from any railway.

Complaints have been received by the board that farmers living at a distance of from 18 to 35 miles from the railway spend on getting the grain to the railway more than it costs to take it from the railway station to Fort William. The farmers of the Mervin District, Sask., furnished information which showed that grain was hauled into Edam, 35, 40, and 45 miles; that on a 14-mile haul from Mervin to Edam, allowing $5 per day for teams and proper allowances for expenses on the way, the cost of haulage was 20 cents per bushel; that on a 35-mile haul, a smaller load had to be taken and the round trip required from two to three days, making the cost of marketing about 32½ cents per bushel; that is to say, farmers hauling a distance of 35 miles to Edam, with a load of 40 bushels, were at an expense of 32½ cents per bushel to get it to the station while from Edam to Fort William, a distance of 1,046 miles, the rate was 14 4/10 cents per bushel. A petition signed by 390 farmers of the Eagle Creek District, Sask., showed that a large amount of grain taken out from the district necessitated a two-days' haul, and the cost of getting the grain to the station was 25¼ cents per bushel as against a rate of 13 cents a bushel from the station to Fort William, a distance of 939 miles.

The cost of haulage on earthen roads runs from 20 cents to 25 cents per ton per mile. From the standpoint of the necessity for railways, the activity of the provincial governments in assisting railway construction, with a view to shortening the average haul of the farmers, appears well justified.

Railway extension is of immediate interest to the distributing centers of the West, as every addition to the railway network widens the consuming area. On the other hand, the farmer who already has railway facilities is not interested in the providing of railway facilities for competing farmers. Extensions into new territory should be made at the risk of the company rather than at the expense of shippers on the old lines. At the same time, consideration must be given to the necessity of enabling railways to obtain additional capital. Extensions of service, betterment of facilities, and the enlargement of terminals have from time to time to be met often in the old settled districts of the country. As a matter of public policy, railway rates should be rates of such a character as to attract investment and to render the railway securities marketable.

Counsel for the Dominion government pointed out that regulation of rates without adequate control of future railway development would likely lead to the duplication of mileage. It is recognized that a certain amount of overlapping will have to take place on account of the lines making grades, the question of physical conditions, and the matter of access to the large centers of population. It does appear that in Manitoba, taking that portion lying south of the 19th Township, Lake Manitoba, and 14th Township as far east as Selkirk, there are 2,850 miles of track. Two thousand miles of track in this area would be sufficient to place railways within 10 miles of every farmer; that is to say, there is 40 per cent. more mileage than the territory requires on the 10-mile basis. In British Columbia there is the paralleling of the Canadian Northern and Canadian Pacific, while in western Alberta there is the paralleling of the Canadian Northern and the Grand Trunk Pacific. It is recognized that paralleling also exists east of Fort William. No opinion is expressed as to how much of this duplication was or was not necessary. The counsel's criticism is, in part at least, well founded, and the necessity for some business control by the government, which will prevent unnecessary duplication of facilities, is established.

BOARD MUST CONSIDER EFFECT ON ALL LINES

Which, if any, of the three lines, the Canadian Pacific, the Canadian Northern, and the Grand Trunk Pacific, should be taken as a typical line? It is impossible for the board to deal with rates in the West on the hypothesis that the Canadian Pacific is the only railway which should be taken into consideration; nor can it be held that the only measure of what rates should be is to be found in the position occupied by the Canadian Pacific. Counsel for the Dominion government expressed the wish that the board would so reduce rates, taking the Canadian Pacific as a standard road, as not to injure other lines He was unable to suggest how that end could be accomplished. nor was this to be wondered at, as, beyond all question, rates based on the Canadian Pacific's power to stand reductions would inevitably bankrupt not only both the Canadian Northern and the Grand Trunk Pacific, but for the future preserve the western provinces to that company insofar as any new companies or new lines were concerned. It would be impossible for any ordinary company to live in competition with the Canadian Pacific under such conditions.

The rates must be considered having regard to the traffic necessities of western Canada and a fair return to the carrier, apart entirely from any question of reserves of the company on the one hand or liabilities of the company on the other

The matter must be dealt with from the standpoint of the principle laid down by the late Chief Commissioner Hon. J. P. Mabee, who, at the outset of the inquiry, laid down the line of action in the following words:

"With reference to the inquiry into the financial standing of the companies, it seems to me that if one is to be investigated they should all be investigated. We should not be submitted to the possibility of prejudice in settling these rates by placing before our eyes the millions and millions of treasure that the Canadian Pacific is supposed to have hoarded up. The question for us to decide is what rates are fair irrespective of how much any company is worth or is not worth."

The board must take the existing railway mileage as it finds it. It was suggested that Parliament had not shown due care in chartering railways, or in allowing them to be constructed. The board has had nothing to do with the steps whereby additional railway mileage came into existence; and it is not in any way concerned with the question of whether or not a railway was constructed from the standpoint of political expediency, and expresses no judgment thereon.

COST BASIS OF RATE MAKING NOT YET PRACTICAL

Counsel for the Dominion government presented as a basis for rate making a method whereby average costs might be ascertained. As explained by the expert, Mr. Muller, it is not concerned with specific or actual costs. An attempt is made to distinguish terminal charges from road haul charges. The terminal charges as well as the road haul charges are computed on a series of averages requiring the use of very complicated statistical methods.

The method which he advocates has never had a thoroughgoing practical test as a basis of rate making. The Interstate Commerce Commission has not yet been able to work out, with its large statistical force, a satisfactory system based on cost. It is further stated that cost estimates of the kind in question cannot be relied upon as decisive factors.

A portion of the present revenue of the Canadian Pacific is due to its having a through line, while the Canadian Northern and Grand Trunk Pacific are not yet in this position. With the opening up of the through lines of the two latter railways, not only will they share in the through business, but business which they are at present handing over to the Canadian Pacific will be handled by them. But Mr. Muller says that to work out rates based on his system, a five-year period should be taken for comparison, and that the rates so worked on his basis should be revised every five years. However, with the change brought about by the opening up of the through lines of the Canadian Northern and the Grand Trunk Pacific, rates based on the past performance of the Canadian Pacific would have no proper application to the new conditions arising.

While recognizing the statistical ingenuity of the theory, it must at the same time be recognized that this theory has never had a practical test under such conditions as are present in this inquiry. There would be many difficulties in applying it, nor can it be said how it would work out. What is needed is a practical working method. With due consideration of all the factors concerned it does not appear how any practical application can in the present instance be made of this theoretical project for a new system of rate making.

After dealing with various arguments of counsel, the judgment proceeds to outline a comprehensive basis of tolls and a complete rate structure for all railways in western Canada subject to its jurisdiction. The rates become effective on September 1.

TERRITORY DIVIDED INTO THREE SECTIONS

The territory west of the Great Lakes is divided into three sections. The first is called the Prairie section, extending from the Great Lakes to the mountains; the second the Pacific section, including mainland rail lines in British Columbia; and the third the British Columbia Lakes section, including the inland navigable waters in that province. A standard scale of maximum freight rates is fixed for each section. The lowest scale in the West, now known as the Manitoba standard, has been amplified to show rates up to 2,100 miles, and will apply throughout the entire Prairie section and on the British Columbia Lake section, abolishing the higher scale now charged in Saskatchewan and Alberta. What will be known as the Pacific scale is on a somewhat higher basis and will govern in Pacific territory. These changes result in substantial reductions from the present standard maximum scales in Saskatchewan, Alberta, and British Columbia.

SUMMARY OF RATE CHANGES ORDERED

Special distributing tariffs on a lower basis are authorized from recognized distributing centers, the reduction from the standard tariff of each territory being 15 per cent. of the Prairie standard scale. The following first class rate examples indicate the character of the reductions, the other classes being proportionately scaled. The first-class rate from Winnipeg to Regina is reduced by 8 cents, Calgary 12, Revelstoke 15, Saskatoon 13, Edmonton 16, Lethbridge 10 cents per hundred pounds. Similar reductions are made from other Prairie jobbing centers.

Through rates from eastern to western Canada are based on those charged from Port Arthur or Fort William. After citing reductions already made by order of the board in the Regina Rate Case, further reductions are made and a more uniform basis is adopted. Examples of the new rates from the lake terminals are given below, those to other points being similarly scaled:

Classes		1	2	3	4	5	6	10
To—								
Winnipeg	Old rates	86	72	57	42	38	34	20
	New rates	85	71	56	42	38	32	19
Regina	Old rates	154	129	102	77	68	59	34
	New rates	146	122	98	73	65	56	33
Moose Jaw	Old rates	159	132	106	79	71	61	36
	New rates	153	128	102	77	69	60	35
Calgary and Edmonton	Old rates	224	186	149	112	102	90	52
	New rates	213	178	142	106	95	85	49
Saskatoon	Old rates	175	146	116	87	78	68	40
	New rates	164	137	110	82	74	64	37
Lethbridge	Old rates	215	179	142	107	96	85	49
	New rates	201	167	133	100	90	79	46
Nelson and Revelstoke	Old rates	303	253	202	138	140	133	73
	New rates	251	209	167	126	115	104	61

Local grain and flour rates are substantially reduced by two methods, first by a direct reduction ranging from 20 to 30 per cent., and secondly by making the terminal Fort William rates the maximum that may be charged between intermediate stations. For example, Broadview to Winnipeg, now 20, becomes 15 cents per hundred pounds; and Calgary to Winnipeg, now 43 cents, through the application of the Fort William rate as maximum, becomes 24 cents per hundred pounds. The westbound rates on flour and other grain products are similarly reduced.

Coal rates from Lethbridge and other Alberta mines are substantially cut; for example, from Lethbridge to Calgary from $1.80 per ton to $1.45, to Edmonton from $2.85 to $2.20, Swift Current $2.40 to $1.90, Regina $3.10 to $2.65, Virden $4.10 to $3.40, Saskatoon $3.95 to $3.30 per ton.

Carload sugar rates from Raymond, Alta., to Prairie points also receive attention, Lethbridge being reduced from 11 to 9 cents, Cranbrook 42 to 38 cents, Nelson 60 to 51 cents, Calgary 31 to 23 cents, Edmonton 42 to 37 cents, Regina 50 to 42 cents per hundred pounds.

The special mileage rates on butter, cheese and eggs, dressed meats and dressed poultry between all Prairie points come in for reductions.

The special mileage tariffs on vegetables in Manitoba are shown to be reasonable; the rates, however, in Saskatchewan and Alberta, which are on a somewhat higher scale, are reduced to the Manitoba basis.

The special rates on fruits and vegetables from British Columbia, which have been revised and reduced since the complaint against them was launched by the United Farmers of Alberta, are left untouched.

The rates on cement from Winnipeg are shown to vary little from those of Ontario, and are not reduced, but the higher

rates from cement plants in Alberta and Saskatchewan are reduced to the Winnipeg scale.

Lumber and joiners' work from British Columbia to Prairie destinations have been already reduced following the board's order in July, 1913. A table showing some of the reductions accompanies the judgment.

The rates on sugar from Vancouver remain unchanged, the complaint of the British Columbia sugar refinery not being sustained.

No reduction is made in live stock rates, which are shown to be reasonable in view of the favorable car load minimum weights and the volume of traffic.

The rates on fence posts, firewood, brick, stone, gravel and sand are found to be generally lower than those applying in Ontario; but the higher scales prevailing in Alberta and Saskatchewan are reduced to the lower Manitoba basis.

Rates on ores, concentrates and smelter products, in and from British Columbia are found to constitute a large percentage of the traffic of that province, and are found remunerative only in the sense of contributing to the general prosperity.

The rate on pig iron from Port Arthur and Fort William to Winnipeg is reduced from 20 cents per hundred pounds to $3 per gross ton.

A review of the judgment shows that the whole structure of western rates, starting from the standard maximum mileage scale, the class tariffs from Lake Superior and Pacific coast terminals, the class distributing rates, commodity tariffs applying on grain, coal, live stock, cement, fruit, vegetables, brick, sand stone, lumber, dairy products, etc., have been closely inspected and definite decisions given in connection with each.

The board has considered the question of local passenger rates in British Columbia very carefully. It finds that the local passenger business is at present being conducted at a loss. It, therefore, does not feel justified in directing any change until the board is afforded an opportunity of seeing what improvement in passenger revenues will result from the improvements in railway grades and operating facilities which the railway is at present making.

Some additional considerations discussed in the full text of the decision include the following:

"A careful consideration of what is necessary to be done shows that these rate changes affect not only the rate situation west of Fort William and Port Arthur, but also the situation east thereof. In addition, the rates west of Fort William and Port Arthur are tied up with the rates between eastern and western Canada in so far as American rail carriers are made use of," says the judgment. While eastern rates are not specifically treated in the reductions, they must necessarily be affected as portions of through rates and in other ways.

The judgment also contains interesting comment on the existing railway situation in the West: "The mere fact that the Grand Trunk Pacific is not now getting adequate returns on its capital, and is not at present making satisfactory profit on that part of its line where it is in full operation (say between Edmonton and Winnipeg) is not a conclusive reason why the rates should not now be revised generally so as, if possible, to place them on a just and fair basis. The company is operating only in part, and profits earned on a part cannot be expected to carry the whole. The road is still in its constructive stage. During the discussion of the present case it was shown that the losses for the first three years of its operation—and while the company has been working up its business under the decisions of commissions of American states—should fairly be charged to capital account. Whether this is so or not, the fact that such a principle has been adopted in the past to some extent seems to afford a very good reason why the returns of the Grand Trunk Pacific hitherto should not be taken as establishing the reasonableness or unreasonableness of rates at the present time.

"To a less degree the same may be said regarding the Canadian Northern. So far that line has had no through business, although operating much longer than the Grand Trunk Pacific. It is constructing both to the east and the west, and is constructing at such a rapid rate that its returns should not be taken as conclusive one way or the other in this issue.

"The Board is of the opinion that the serious drop in railway earnings that the past few months have shown is not a permanent condition, notwithstanding that the earnings of the Canadian Pacific for 1912 and 1913 probably represent a maximum of return, and that, just as soon as the other lines are in through operations, it will be some time before that maximum will be again reached.

"While it is beyond all question that, speaking generally, the rates ordered on one line control to a large extent the rates on other lines, and that it serves no useful purpose to prescribe rates only as against one carrier with the idea of assisting another, yet in so far as the distributing tariffs are concerned, in some instances the mileages of the Grand Trunk Pacific and Canadian Northern are shorter than those of the Canadian Pacific. To the extent that these shorter mileages would enable either company to charge a lesser rate than fixed for the Canadian Pacific, I am of the opinion that both companies should have the opportunity of doing business, if they so desire, at the longer mileage rates and without regard to the competitive advantage which their shorter mileage would give them. These rates, therefore, are made effective only against the Canadian Pacific."

Comments of President Shaughnessy

Sir Thomas Shaughnessy, president of the Canadian Pacific, made the following statement on the decision:

"I have followed the proceedings before the Board very closely, and have no hesitation in saying that the judgment goes beyond anything warranted by the facts as presented. The evidence proved conclusively, as the Board of Commissioners found, that there was no discrimination as charged in the complaint, and the reasonableness of existing rates in existing circumstances was not seriously disturbed by the attacks of the complainants. Apparently, the Board, actuated no doubt by what they consider to be the ultimate best interests of the country, have put into effect reductions in rates which, while they might have a semblance of justification some years hence, are such as, viewed in the light of present commercial and transportation conditions, cannot but be regarded as unnecessarily and unjustifiably drastic in character. The Canadian Pacific can stand it, and this seems to be about the only excuse that can be urged in support of the commission's findings.

"How other companies, still in process of construction, which have not been able to build up supporting traffic and are faced with the necessity of heavy borrowings for the next few years at least, regard the decision, is for them to say."

Threatened Railway Strike in Italy.—The government of Italy has been doing its utmost this past week to check a threatening stricke of frightful proportions by nearly all the employees of the Italian State Railways. It is reported that resolutions in favor of a general strike have been adopted in nearly all the Syndicalist centers. The government for its part has sought to come to terms, but it has decided that the latter are not accepted, the military will be used to run and protect the trains. Arrangements to that effect have already been made and detachments have been sent to the stations at such important places as Milan and Rome. The demands of the employees deal with wages and hours of service. The men, some of whom receive only 34 cents a day, are demanding a minimum wage of 60 cents with 20 cents extra for night work. Employees in nearly all services are asking for a ten-hour day. Enginemen and firemen, for example, want to work not more than ten hours by day and eight by night out of the twenty-four when running slow trains and ask that their hours be diminished as the speed increases until they are reduced to a minimum of five hours daily. They also want a 34 hours' rest weekly in the town where they reside. Employees in all services demand a minimum pension of $100 a year. The government estimates that to grant the demands of the railwaymen would increase operating cost approximately $10,000,000 yearly.

WHAT IS THE MATTER WITH THE SOUTHERN PACIFIC STUDENT COURSE?*

BY NORMAN COLLYER
Chief Clerk to President, Southern Pacific Company

It is most fitting that at a conference of apprentice instructors we should consider the Southern Pacific student course in railroading. The course is now in its tenth year, and I shall endeavor to give a frank review of its aims, its operation, and its results.

In the ringing article by George M. Basford in the last *Railway Age Gazette* I was struck with the following passages:

"Perfection of performance is not accidental; it is the result of unremitting training, first individual and then collective. . . . If some years of study of the personnel of railroads has guided my thought correctly, railroads will find themselves unable properly to cope with their problems if they do not seriously and consistently inaugurate systems of training."

Prior to 1900, the special apprentice had been confined almost exclusively to one department. On the Great Northern, President Hill had tried the experiment of affording certain young men—one of them his personal stenographer—the opportunity of broadening their field of vision by work in several different branches of the service. These and other similar instances were the outcome, as a rule, of some personal relationship with the management. To my knowledge, the Southern Pacific Company was the first railroad in the United States to adopt an orderly, systematic scheme for the development of executive talent through the medium of apprenticeship. The idea was conceived and put into effect by Julius Kruttschnitt while vice-president and general manager of the company at San Francisco. It was first crystallized into syllabus form, under the administration of Vice-President E. E. Calvin. In 1909 it was broadened and strengthened, and January 1, 1913, by direction of President Sproule, it was extended to embrace the traffic and accounting as well as the various operating departments.

The aim of our student course is to give to young men in the employ of the company an opportunity to pass through different departments for the purpose of gaining such co-ordinated knowledge of the entire railroad as will fit them better to assume positions of responsibility. It is, in fact, a laboratory course wherein the student performs the actual work of the department to which he may be assigned, supplemented by a parallel course of reading in text books and railway publications and periodicals. Much thought has been given to the arrangement of the different periods and further changes are under consideration. Briefly, the procedure is as follows: Upon appointment, the student is first placed at a station of medium size for a term of six months. This is because the station agent handles both the beginning and the end of transportation. The student is expected to perform such duties as are assigned to him by the agent, and the agent is expected to afford him such diversified experience as will give him an all-around knowledge of station work, including ticket office, warehouse, baggage room, yard, and the solicitation of business. Being an extra man, the student is not bound down to routine, but is permitted to distribute his time in such a way as to treat each feature with equal thoroughness. Next, the student is assigned consecutively to maintenance of way, the office of the superintendent of transportation, motive power, train service, accounting department, and tariff bureau, spending three months in each. This completes his second year as a student, and he should now have a working knowledge of the several departments of the railroad and their mutual interdependence. At the student's option (subject to the approval of the management) he next elects to specialize in either operation and maintenance, passenger and freight traffic, or accounting. If he chooses operation and maintenance, his progress is as follows:

Maintenance of way	4 months
Motive power	3 months
Signals	2 months
Stores department	2 months
General manager's office	2 months
Student with trainmaster	5 months

This completes forty-two months' service as a student, which is the length of the course. It will be seen that the operating student has gone more deeply into maintenance, motive power and transportation, and has also taken up several additional features. After his graduation he is given such special experience as is needed to fit him for a regular position; thereafter everything depends on himself.

The student specializing in passenger and freight traffic spends his last eighteen months as follows:

Passing report clerk at gateway junction point	3 months
Passenger ticket office	5 months
Student solicitor in large city	4 months
Student district freight and passenger agent	6 months

If he specializes in accounting, the distribution is as follows:

Auditor freight accounts	3 months
Auditor passenger accounts	3 months
Division accounting bureau	6 months
Auditor of disbursements	3 months
General	3 months

In either case, after the final polishing off, he is put in the railroad sea and told to swim, and he must either swim or sink.

One of the best means of perfecting a plan is through honest and constructive criticism. I have set down the various criticisms of the student course, as I have heard them expressed, and after reading them to you I will try to answer them, as well as I can:

1. It is not practical.
2. It is a waste of the company's money.
3. Students work virtually without supervision, hence fall into idle and indifferent habits.
4. It is necessary to have "pull" in order to become a student.
5. It is too long.
6. It is impossible to learn anything about the . . . department in three months. (Insert name of department in which the critic happens to be employed.)
7. It is a source of discouragement to the rank and file of employees.
8. Graduates of the course have not made good, therefore the course is a failure.

Criticism other than this usually takes the form of ridicule, which is unworthy of consideration in a serious discussion.

1. *It is not practical.*

This is the objection generally expressed by those not in sympathy with the course. It is a phrase easily said, and which may be construed in a variety of ways. I understand it to mean that the course gives the student a smattering of knowledge which is not available for his practical everyday uses; that what is wanted is not "Jack of all trades and master of none," but a trained specialist in some particular line of work. The weakness of this theory is disclosed when the specialist is promoted to a position of greater authority in which he is called upon to supervise both the familiar and unfamiliar phases of the business. He not only lacks versatility, but almost invariably he gives undue prominence to the work in which he has been trained and discredits the importance of those functions with which he is not familiar. Ask any officer whether his department is appreciated and see what he says. This hits the mechanical department along with the rest. As Mr. Basford says:

"Mechanical and operating officials have everything in common as a problem. Each knows much that the other needs to know. They are too far apart. I believe they may be brought

*A paper read before the Apprentice Instructors Section, Safety First Conference, University of Nevada, January 26, 1914.

together through training which will produce railroad men and not department men."

While it is true that our "laboratory course" is not and can not be carried to the stage of highly trained routine efficiency in every detail, nevertheless many of the students have absorbed and retained a surprising amount of detailed knowledge which they have afterwards used with disturbing success in penetrating the excuses passed across the departmental boundary line. Better still, they have helped to make their own departments more valuable to other departments and hence to the organization as a whole. This is surely making a practical application of special knowledge. The earnest student recognizes his limitations in this respect; but the groundwork of the course points the way, which, if followed assiduously, with added experience means success.

Singularly enough, one of the bases for the charge that the student course is not practical is the fact that the students are required to follow a course of reading. There seems to be an impression that the student goes about his work with a reference volume always in his hand—very likely written by an impractical author. In answering I may say that our bibliography has been selected with the utmost care. It would be difficult to conceive of any railroad man who would not be helped by reading such books as "Freight Terminals and Trains," by J. A. Droege, general superintendent of the New Haven, or "The American Transportation Question," by Samuel O. Dunn, editor of the *Railway Age Gazette*, or "Letters from an Old Railroad Official to His Son," by Major Hine, until recently vice-president and general manager of the Arizona Eastern. Further, the course plainly states that all reading must be done outside of working hours.

A very valuable feature of the course is the policy under which the student is transferred from one division to another at the close of each period, until by the time he is graduated he has covered the entire system. This not only gives him a definite, first-hand knowledge of the geography of our railroad, including all of its numerous climatic and topographic characteristics, but it likewise affords him a variety of experience in operating conditions which is seldom attainable on a single division. Further, his constant attrition with "many men of many minds" tends to stimulate his mental powers as well as to broaden his knowledge of human nature. The wide acquaintance thus formed among our officers and employees has occasionally proven serviceable in later years.

It seems to me that every officer and employee with whom the students come in contact have it within their power to help to make the course practical. If there is a more practical way of learning how to do a thing than by *doing* it, we have yet to learn what it is. Remember that a student's sojourn with you is limited. Cram him with information—he will absorb it like a sponge! Load him with work—he will develop the faster for it! Give him all the responsibility you dare—it strengthens him! If you don't believe the course is practical, help to make it practical!

2. *It is a waste of the company's money.*

Students are paid $75 a month to begin with, increasing by five dollar increments until the student is receiving $100 a month during the final period; hence, the total wage investment in each student approximates $3,600. Formerly the students were carried on a special payroll in the general offices; now, on the theory that all of the employees under the jurisdiction of any department should appear on the payroll of that department, they are carried on the payrolls of the department to which they are assigned. This expense, however, is not charged against the department, but is transferred by the auditor to "General Expenses." The head of the department, therefore, is not responsible for the cost of the student, the hazard of the investment being assumed by the company. This is proper, because it is impracticable to forecast the particular departments to which graduates of the course may be assigned. As in every form of apprenticeship, we are building for the future, and hence we should not measure the salaries paid with present returns. Notwithstanding this, it has occasionally happened that a student by some thoughtful suggestion has more than saved his salary for several months.

3. *Students work virtually without supervision, hence fall into idle and indifferent habits.*

The officer in charge of students is responsible for the student corps. He assigns them to the divisions or departments where they are to be employed, receives from each of them a monthly report on the work and reading done, and gives them occasional examinations on reading. Upon the completion of a period by a student a confidential report is sent in by the head of the department—all of which becomes a matter of record and enables the officer in charge of students to answer questions on a student's progress with a fair degree of accuracy. This is but long range supervision, however; immediate and active supervision rests with the head of the department wherein the student is employed. This phase of the question should not be lost sight of.

The first step in any form of supervision is to let men clearly understand what is required of them; the next step is to see that they do it.

4. *It is necessary to have "pull" in order to become a student.*

This charge is contrary to fact. Not since the inception of this work has influence or "pull" been able to govern in the slightest degree appointment to a studentship. Since a mistake made at the beginning would be perpetuated and become a discredit to the company and the student system, we are exceedingly cautious in our appointments. First of all, the candidate must be an employee of the company; not only for the reason that any other policy would be an injustice to our employees, but also because we thereby get a better line on the applicant. To be mature enough to understand and appreciate his opportunities, he must be over 21; and to be young enough to have retained his enthusiasm and freshness of mind, he must be under 30. He must be unmarried, and remain so as a student, because we place our school on as high a plane as those of Annapolis and West Point, where the same rule prevails. The many necessary expenses of the course, the numerous changes from point to point, and the absorbing character of the work, unite to make a man of family inadvisable. We prefer college graduates, if we can get the right sort; but we do not close the door on the self-educated man of signal merit. We demand rugged health, and the importance of a stalwart physique is not overlooked. Further, the applicant must be alert mentally, cool headed and a good mixer. In fact, we set so high a standard that the difficulty is in finding men who can measure up to it. Qualities of leadership are rare and not always to be readily detected; hence, the necessity for exhaustive investigation. After we have examined and probed and sounded to the fullest extent, no applicant is accepted without the personal approval of the president or one of the vice-presidents.

5. *It is too long.*

It has been claimed, with some merit, that the course removes a young man from active responsibilities for too long a time at the formative period of his life. In answer, I can only say that I do not see how it can be cut down and still cover the ground. It is now practically the equivalent of a full college course, omitting the vacations, or, from a post-graduate standpoint, the equivalent of a course, say, in medicine.

6. *It is impossible to learn anything about the . . . department in three months.*

The students are admonished that they must touch the "high spots," because their time everywhere is limited. The critics who make the above assertion are generally those who neglect to distribute the students' time according to a thoughtful, preconceived plan, but would allow them to consume the first thirty days in addressing envelopes, taking seal records, or doing some similar work that any bright boy of sixteen could learn in forty-eight hours. It frequently happens that although the student is not

paid for by the department, he is diverted to the department's uses for an indefinite period on account of shortage of force. This is not only as much a misuse of the company's money as building a siding and charging it to a GMO for a new depot, but is moreover unfair treatment of the students, all of whom merit, and many of whom have commanded, considerably higher salaries than they are receiving. For their services they are justly entitled to a fair return in the way of experience. The collapse of the medieval system of apprenticeship was caused by the apprentice being required to spend much of his time performing the household drudgery of his master, which advanced him little or not at all in the "arts and mysteries" of his craft. Students, if given the chance, are capable in three months of learning quite a little about any department of this company.

7. *It is a source of discouragement to the rank and file of employees.*

There is a prevalent impression that having adopted the student plan, the company proposes to promote none but students. Let us examine into the facts of the case. During the past five years this company has appointed eleven assistant trainmasters, of which three have been graduates of the student course. It has appointed twenty-nine trainmasters, of which six have been graduates; and the office of assistant superintendent has been filled twenty-eight times, three times with student graduates. The Portland and Salt Lake divisions are excluded prior to their coming under the San Francisco jurisdicition. Lumping together these three positions, student graduates have been appointed twelve out of sixty-eight times, a ratio of eighteen per cent. I see no reason for believing that this ratio will be greatly modified in the future. Students have likewise been appointed to other positions; but since the course until recently embraced only the operating department, its effects in that department have been the most conspicuous.

For the ambitious young man who is eligible for appointment, the course offers a possible avenue for promotion. On the other hand, the competent employee who is not eligible to a studentship need not despair, because promotions to official positions are being and will be made from the rank and file. And the officer of equal grade with the student graduate need not fear him, because if he is the better man, he, and not the student, will secure further advancement. It should be made plain that a student graduate is neither advanced nor held back from the mere fact of his having been a student. If he has made of his training a tool of special skill and learned to apply it in a practical way, he will win promotion unless there is some one in line better equipped than he is. If he deserves dismissal he will get it as quickly as any other employee. It is the man today that counts, and not what he may or may not have been.

8. *Graduates of the course have not made good, therefore the course is a failure.*

In the syllabus of the course occurs the following:

"It should be understood that the appointment to a studentship does not carry with it a promise or an obligation on the part of the company that the appointee will receive an official position upon the completion of the course. A student who has been graduated from the student class will be given preference in the filling of a vacancy, provided he is temperamentally fitted to meet the peculiar conditions of the position."

Not all of the students have been permitted to finish the course. In the case of those who have been graduated to date, it has been deemed good business to give them their chance. The fact that with one exception they are holding down their jobs, and that some of them have been advanced to other and more important jobs, proves, it seems to me, that they are making good.

Nicholas Murray Butler said:

"What science and practical life alike need is not narrow men, but broad men sharpened to a point."

Before he can have developed his highest efficiency, the student graduate must undergo the sharpening process. It is inevitable that immediately upon his graduation he can not measure up to the standard of efficiency of a trained specialist of twenty-five years' experience in his particular line. Like every man breaking into a bigger job, he must be allowed a reasonable time in which to learn to use the authority with which he is vested. It is our belief that the graduate of ten years will be better, broader and more competent for having been a student, if he has the right stuff in him; and if he has not the right stuff, he will not last that long.

To the thoughtful young man contemplating railroading as a life work, the student course offers an opportunity not to be overlooked. From a material standpoint the figures are interesting. There are nine graduates of the student course in the employ of the Southern Pacific Company. They have been in service an average term of eight years and three months, and their average monthly wage is $193.33. These figures compare favorably not only with the average wages of other employees of like length of service, but even with the income of college graduates in other lines of industry, although railroads are notable for paying low salaries. The opportunities in the railroad business are limitless; and while advancement can not come to all, it means a good deal to a young man to be in line.

So when you run across a student you are likely to find a young man very much in earnest who is performing a difficult task in a constructive way; who is making great sacrifices for the sake of gaining experience, and who is frequently being retarded instead of helped to that end; who is entitled to your respect, not only because of his employment, but for himself.

In the language of *Tommy Atkins:*

> "We aren't no thin red 'eroes, nor we aren't no blackguards, too,
> But single men in barracks, most remarkable like you."

There is nothing spectacular about the Southern Pacific Student Course. We do not claim to make superintendents and general managers overnight. We are just trying to make all 'round railroad men in a new way.

THE NEW HAVEN SITUATION

The following is an abstract of a statement submitted by the New York, New Haven & Hartford management to the stockholders:

On June 20, 1913, the Interstate Commerce Commission made public its report entitled "The New England investigation in the matter of rates, classifications, regulations and practices of carriers."

In an effort to conform to the suggestions in the report of the commission, to improve the general situation, and with the hope and belief that a fair opportunity will be given for the operation of the properties, the directors have taken the following action:

(1.) A change in the management of the New Haven Company by the selection of Howard Elliott and James H. Hustis, who now fill the positions of chairman of the board of directors and president respectively, coming into the management September 1, 1913.

(2.) The selection of John B. Kerr, on September 18, 1913, as president of the New York, Ontario & Western Railway Company.

(3.) The selection of L. S. Storrs, on December 24, 1913, as president of the Connecticut Trolley Company.

(4.) The selection of A. E. Potter, on December 27, 1913, as president of the Rhode Island Trolley Company.

(5.) The cancellation, on February 1, 1914, of the so-called "traffic agreement" between the New Haven and the New York Central in regard to the Boston & Albany.

(6.) The withdrawal, on January 24, 1914, by the New Haven Company from the board of directors and the management of the Boston & Maine.

The reorganized management of these properties with their independent presidents and officers have been perfecting many

details of the organization, so as to promote efficiency, safety. and every economy consistent with the reasonable up-keep of the property, and to gain the support and confidence of the patrons, the public and the employees of the road.

PENDING INVESTIGATIONS

On February 7, 1914, a resolution was passed in the Senate of the United States, calling for a further investigation by the Interstate Commerce Commission.

The company has been investigating some of the subjects under inquiry by the commission and all information in its possession has been given to the representatives of the commission with request that they report promptly. As the commission has these matters in hand the company feels that it should make no public statement until the commission makes its report.

RULES FOR SAFETY AND RELATIONS WITH EMPLOYEES

The North Haven accident of September 2, 1913, following as it did, other serious accidents, made it imperative that the rules and regulations of the company be of such a character as to safeguard to the greatest extent possible the lives of the public and the employees.

For some time previous to this accident negotiations had been conducted with committees representing the engineers and firemen to revise rules which were not in accordance with modern railroad practice. The new management felt that it owed a duty to the public as well as to the employees to put the new rules into effect at once. The engineers and firemen felt aggrieved at this position of the company and voted to strike. On October 18, 1913, however, the matter was adjusted amicably with the employees, and rules containing the principles for which the management contended remained in effect.

THE IMMEDIATE FINANCIAL SITUATION

In 1913 the company had a very large floating debt, because of the Massachusetts law prohibiting any funded debt exceeding in amount the paid in capital of the company. This law was changed in July, 1913, so as to permit the issue of bonds to an amount equal to twice the amount of the capital stock.

The directors in July, 1913, arranged for an issue of six per cent. convertible debentures to the amount of $67,552,000, to be offered to the holders of the stock and the convertible debentures of the company. General financial conditions at that time were not favorable, and in order to make certain that the company would have its money when needed the directors caused this proposed issue of debentures to be underwritten. The stockholders approved this arrangement at a meeting August 22, 1913.

The issue of these debentures though opposed before the Public Service Commission of Massachusetts, was on October 14, 1913, finally approved by that commission. An appeal was taken from this decision to the Supreme Court of Massachusetts, which on January 9, 1914, decided that the law of Massachusetts did not permit the issue of debentures convertible into stock.

There were $40,000,000 of notes to meet on December 1, 1913, and $5,000,000 of bonds on February 1, 1914. Therefore it became necessary pending the decision, to borrow on November 18, 1913, these sums and later other amounts to pay for new equipment and for improvements which could not be stopped or postponed. Today the company must prepare to meet notes maturing prior to July 26, 1914, of nearly $54,000,000 of which the most important are the 6 per cent. notes of November 18, 1913, amounting with interest and discount on May 18, 1914, to $46,550,000.

Based on the results for two-thirds of the year an estimate has been made for the fiscal year ending June 30, 1914, which indicates that for this period there will be only a small surplus after paying fixed charges.

REASONS FOR DECREASE IN INCOME

There has been a heavy decrease in earnings due to general business conditions.

There has been an increase in transportation expenses due to increased rates of pay, to heavy damage claims and unusual expenditures because of the accidents in 1913, to increasing demands from the public and the public authorities for service and to more severe weather conditions.

An increase in maintenance of way expenses due to some increase in rates of pay, to work that should have been done early in the year 1913, and to more work upon improved signals, all of which are necessary for safety.

An increase in maintenance of equipment expenses due to increased rates of pay, to a change in the method of charging depreciation (which results in an additional annual charge to operating expenses of $500,000), to repairs on freight cars purchased in 1906, 1907 and 1098, now requiring heavy work to keep them in suitable condition, and to deferred work on electrical equipment.

A decrease in revenue from outside operations due almost entirely to the loss of revenue from parlor and sleeping cars because of the transfer of this service to the Pullman Company. The contract was made with that company in order to provide immediately steel parlor and sleeping car equipment and to relieve the New Haven company of a very large investment for such equipment. All parlor and sleeping cars are now of all-steel or steel-underframe construction and practically all coaches in the through New York-Boston trains are of steel.

A decrease in other income due to a decrease in or cessation of dividends from the New York, Ontario & Western, from the trolleys, and from the steamships, as these companies are affected adversely by the same causes that affect the New Haven; also to a smaller amount of interest on bank balances due to smaller deposits carried by the company.

An increase in fixed charges, rentals, etc., estimated as follows:

Rentals	$387,100 increase
Miscellaneous taxes	10,600 increase
Boston Holding Company (on account of no dividends from Boston & Maine)	615,500 increase
New York, Westchester & Boston guarantee	86,200 increase
Boston & Albany agreement	103,100 increase
Interest on loans (on account of increased amount of short term notes, bearing 6 per cent.)	1,008,600 increase
Miscellaneous	49,000 decrease
Total increase	$2,162,100 increase

The increase in rentals is due largely to the constantly increasing investment in the Grand Central passenger terminal at New York. In 1903 the payment made by the New Haven company for the entrance to New York City and for the use of the passenger terminal was $1,038,182. For the year ending June 30, 1913, it was $2,983,969, or about 30 cents for each passenger. The cost will be more for the year ending June 30, 1914.

Reports to the Interstate Commerce Commission for three periods five years apart show as follows:

Year	Number of men employed June 30	Total compensation	Average yearly wages based on number of men employed June 30
1903	31,028	$19,659,087	$633.59
1908	31,735	23,876,652	752.38
1913	34,521	28,151,433	815.49

Increase in number of men employed—1913 over 1903—11 per cent.
Increase in total compensation —1913 over 1903—43 per cent.
Increase in average yearly wage —1913 over 1903—29 per cent.

During the fiscal year ending June 30, 1914, the increases in rates of pay will have increased the total payroll about $800,000 over the previous year. The greater part of these payroll increases have been the result of awards under the Federal arbitration acts. If the same rates of pay had been in effect in 1913 as in 1903, the total payroll for the year would have been approximately $7,200,000 less.

The federal nine-hour law, the ash-pan law, the safety appliances law, the boiler inspection law and the full-crew law, have increased the expenses of the company nearly $200,000 per year.

The cost of accounting ten years ago was $190,000 per year. At the present time it is about $500,000 per year. While the

increase in business has had its effect on accounting cost, part of the increase is due to the accounting requirements of the Interstate Commerce and state commissions.

The recent federal act requiring the valuation of railways will increase the expenses of this company about $60,000 per year for several years.

These facts about increased rates of pay and the requirements by the government are not referred to in a spirit of criticism, but to show the effect they have on the income of the company.

If, however, the people through their governmental agencies impose these expenses upon the railroads they must provide the money with which to meet them by increasing the rates.

The electrification of the road between New York and New Haven has been very costly, and until the work is completed and full electric service is in operation any possible economies cannot be realized. Any further electrification must be postponed because of lack of capital.

FREIGHT AND PASSENGER RATES

While the company has had to add constantly to its capital investment and to increase its operating expenses, the freight rates, on the whole, have remained stationary or have decreased. In ten years, there has been a reduction of 69/1,000 of a cent in the average rate received for hauling two thousand pounds one mile. This very small sum, applied to the freight business of the New Haven road for the year ending June 30, 1913, would have increased freight earnings $1,800,000.

The increase in wages and the decline in freight rates alone make a difference of over $9,000,000 a year in income, equal to 6 per cent. on $150,000,000 of capital.

The New Haven road is unusual in the relation between its freight and passenger business. Considering the railroads of the country as one system, two tons of freight are carried for each passenger, but on the New Haven only one-third of a ton is carried for each passenger.

During the first eight months of this fiscal year the earnings from passenger trains were 50.6 per cent. and the earnings from freight trains 49.4 per cent. of the revenue from transportation service. In the same period the average cost (including taxes) of running all trains one mile was $2.12. The revenue per passenger train mile was $1.90 and per freight train mile $4.17. The passenger train mileage is about double the freight train mileage, so that the disadvantage of the New Haven as compared with roads having relatively more freight train mileage is apparent. The passenger train mile revenue is adversely affected by the large proportion of passengers carried on "commutation" and "trip" tickets. These passengers comprise 43 per cent. of the total passengers carried, and they yield but 13.6 per cent. of the total passenger revenue.

GROUNDS FOR ENCOURAGEMENT

In considering the estimate of the financial results for the current fiscal year three things must be borne in mind:

First: The estimate is thought to be conservative.

Second: The position of the company with respect to the decrease in net revenue is not peculiar. The New Haven, with all other railroads in eastern territory, has suffered a decline in its revenue with many increases in expenses which are beyond the control of the management. For the seven months' period ending January 31, 1914, compared with the same period one year ago, the loss in net operating income on thirteen of the important lines in eastern territory, and the amount of each dollar of gross earnings absorbed by operating expenses and taxes, are as follows:

Road	Per cent. of Operating Revenue taken by Operating Expenses and Taxes		Decrease in Net Operating Income compared with same period last year	
	1914	1913	Decrease	Per cent.
N. Y. N. H. & H.	76.7	70.8	$3,446,620	26.9
New York Central (Inc. B. & A.)	80.9	76.5	3,160,002	19.3
Philadelphia & Reading	67.1	60.4	2,741,966	22.4
Baltimore & Ohio	76.2	72.9	2,227,430	13.9
Erie	75.1	68.6	2,222,816	22.3
Pennsylvania	78.5	76.5	1,979,615	8.0
Central R. R. of N. J.	67.3	59.7	1,557,336	22.3
Boston & Maine	83.5	80.4	982,276	16.7
Lackawanna	66.5	63.8	843,491	9.1
Delaware & Hudson	66.7	61.7	749,316	13.7
Boston & Albany	79.1	73.8	528,876	19.5
N. Y. O. & W.	75.6	69.1	436,936	24.6
Long Island	76.5	75.2	374,433	17.5

Third: Prolonged agitation about the company and its management, causing demoralization and loss of efficiency; serious wrecks; falling earnings; increased wages and costs; higher rates for money; work done and investments made for the future with no adequate return at present; demands for more elaborate service and facilities; uncertainty about the relations with the government; all form a combination of adverse circumstances not likely to be repeated.

The New Haven road is a great property with many elements of strength. It serves an active, prosperous people and many industries, and in times of fair business throughout the United States, has great earning power. With a resumption of business—with confidence restored—with help from state and federal authorities, the results should be much better.

NEGOTIATIONS WITH THE DEPARTMENT OF JUSTICE

During the month of September, 1913, information was received which resulted in a conference on September 23 between the attorney-general of the United States and Mr. Elliott about a suit contemplated by the federal government to dissolve the New Haven system.

On October 3, the directors appointed committees to investigate and report upon the Connecticut trolleys, the Rhode Island trolleys, the steamships, the Boston and Albany agreement, the Massachusetts trolleys, the Boston & Maine, and to confer with the attorney-general.

On October 9, this latter committee (Howard Elliott, chairman, T. De Witt Cuyler, and A. T. Hadley) called upon the attorney-general and the Interstate Commerce Commission and explained the active work being done by the directors about the serious and complicated questions raised in the report of the Interstate Commerce Commission and by the department of justice.

During October, November and December, these committees did a great deal of work, called in a number of experts, and there were numerous interviews between representatives of the company and of the department of justice.

DEMANDS OF DEPARTMENT OF JUSTICE

On December 13, in answer to a request of the company, the department of justice made the following statement:

(1.) That the New Haven absolutely part with its stockholdings in the Boston & Maine.

(2.) That the arrangement between the New Haven and New York Central, as to the Boston & Albany, be canceled.

(3.) That the New Haven part with all steamboat holdings.

(4.) That the New Haven part with all its trolley holdings.

(5.) The New England Railroad Company as it originally existed when taken over by the New Haven, to become an independent system and operated as such.

These demands were considered carefully by the directors and on January 6, 1914, Mr. Elliott suggested to the attorney-general alternative plans as a basis of settlement.

These suggestions were not acceptable to the attorney-general, and after another meeting of the board of directors Mr. Elliott and Arthur T. Hadley were authorized to return to Washington and arrange, if possible, a plan of settlement. This was done on January 10.

The directors ratified the memorandum on January 15 and authorized the employment of Messrs. Moorfield Storey of Boston, Walker D. Hines and John W. H. Crim, of New York, as special counsel to assist Chairman Elliott in completing the details of the negotiations.

On February 2 a form of trust deed and names of trustees for the Boston Holding Company stock were submitted to the at-

torney-general. He thought it necessary to consult with the authorities of Massachusetts, and later the authorities of New Hampshire desired to be heard. All of this negotiation took much time, but finally on Saturday, March 21, an agreement was reached as outlined in the following statement prepared by the attorney-general:

MEMORANDUM OF THE SITUATION IN RESPECT OF THE NEW YORK, NEW HAVEN & HARTFORD RAILROAD COMPANY, AGREEMENT OF MARCH 21.

The attorney-general has indicated to the representatives of the New York, New Haven & Hartford the arrangements which he thinks would result in bringing the affairs of that company into harmony with law. The representatives of the railroad are willing to accept the requirements indicated and to endeavor to put them into effect without delay if approved by the stockholders in a meeting to be called at once.

The indicated arrangements, stated in general terms, follow:

(1.) The Boston Railroad Holding Company is a Massachusetts corporation holding a majority of the stock of the Boston & Maine, and 90 per cent. of the former's stock, in turn, is owned by the New Haven. The charter of the holding company prohibits it from disposing of the Boston & Maine stock. The legislature of Massachusetts will be asked to remove this prohibition and, if this is done, the stock of the holding company will be transferred at once to five trustees, and after arrangements have been made to protect the minority stock of the holding company, they shall sell the Boston & Maine stock, prior to January 1, 1917.

(2.) The stocks of the companies which control the Connecticut and Rhode Island trolleys will be placed in the hands of trustees—five for each state—and shall be sold within five years from July 1, 1914.

(3) The majority stock of the Merchants & Miners Transportation Company, now held by the New Haven Railroad, will be placed in the hands of three trustees and shall be sold within three years from July 1, 1914.

(4.) The minority stock in the Eastern Steamship Corporation held by the New Haven shall be sold within three years from July 1, 1914, and in the meantime shall be deprived of voting power.

(5.) Whether the New Haven shall be permitted to retain the sound lines will be submitted to the Interstate Commerce Commission for determination under the provisions of the Panama Canal Act.

(6.) The Berkshire trolleys shall be sold within five years from July 1, 1914.

(7.) A decree embodying the foregoing shall be entered in the United States District Court for the Southern District of New York. The decree shall further provide that upon application of the New Haven or the trustees, and for good cause shown, the time within which any of the above-mentioned stocks shall be sold may be extended by the court.

Trustees satisfactory to all parties have been suggested. Those proposed in connection with the Boston & Maine stock have signified their willingness to serve and their names are: Marcus P. Knowlton and James L. Doherty, of Springfield, Mass.; James L. Richards and Charles P. Hall, of Boston, and Frank P. Carpenter, of Manchester, N. H. Names of the others will not be made public until acceptance by them is fully assured.

The essential reason for placing the properties in the hands of trustees is to secure their immediate independent management.

The outlines of the proposed decree and trust agreements have been discussed and are understood. Their verbiage remains to be worked out, but no difficulty is anticipated in that respect.

This statement has the approval of both the attorney-general and the representatives of the railroad.

The attorney-general insisted that the holding of the properties named was contrary to law, but throughout the negotiations realized the seriousness of the situation and expressed an earnest desire to adjust it with the minimum amount of disturbance to business and loss to the stockholders of the New Haven road.

GENERAL CONCLUSIONS

This recital of conditions to be met and dealt with by the directors and management indicates some of the difficulties of the situation and must be considered in deciding what the company can do.

Suggestions have been made within the last few weeks by the press, by a limited number of stockholders and by various commercial organizations, that the company should have let the attorney-general of the United States bring a general dissolution suit instead of making an amicable adjustment.

If the financial plans of the company had not failed, if general business and the earnings of the company had not shown such discouraging decreases, and if there had been a general friendly sentiment and feeling of confidence throughout New England towards the company, the directors might have been justified in contesting the government's right to insist upon the dissolution demanded.

Under the conditions, however, confronting the company the directors felt that a lawsuit, with attacks which would, without doubt, have followed from other sources, would have resulted in a receivership of the property. The directors have felt that it was their duty to the stockholders and to the people of New England to do everything within reason to avoid this, believing that the results of a receivership, with its complications, entanglements, and delays would be disastrous, not only to the properties of the company, but to the commercial, industrial and financial welfare of New England.

It is believed that the information contained herein as to the unfavorable business conditions, and the serious and difficult character of the company's financial necessities, will aid the stockholders in understanding why the directors feel that it is to the interest of the stockholders and of the people of New England to make this adjustment with the government.

The business of New England cannot prosper unless the railroads can be supported so as to furnish the facilities needed, and the railroads cannot do this unless the business of New England is in a healthy condition; the two must, of necessity, act and react on each other.

Today no improvements are being made except those absolutely necessary for safety, and work already authorized is stopped or postponed wherever possible. Service is being curtailed as much as possible and every economy consistent with safety, reasonable supervision and service is being pushed.

In round figures, the properties under discussion represent upon the company's books more than $135,000,000 of value.

The report of the Interstate Commerce Commission on June 20, 1913, said, in regard to the outside properties of the New Haven:

"They are for the most part of substantial value and in many instances are a kind of property the value of which should improve. The financial condition of the company calls for careful consideration and prudent action but gives no occasion for hysteria."

Your directors, therefore, hope that with reasonable time the assets of the company can be preserved, the earning power restored, the physical condition improved, and the company made what it should be, a great and useful servant of the people of New England, at the same time paying a return to its owners.

The real question today is not whether it was wise or right to have acquired the various properties under discussion, but to have a policy adopted now by the company, by the people whom the various properties serve, by the officers and agents of the government both state and national, and by the press, that will help to prevent conditions that might bring about an industrial and financial crisis—a policy that would at least give a chance to save a situation filled with perplexities.

Your directors, by unanimous vote, recommend that you

approve the arrangement with the attorney-general. It should stop the charge that the company is openly violating the law and should make it easier for the company to take care of maturing obligations and to provide additional capital for needed improvements in signaling, bridge renewals, additional tracks, equipment and modern engine terminals. It should also permit the officers of the company to devote their time and energies to the management of the property, to overcoming the ill effects of long continued criticism, and to bringing about a restoration of that confidence which is so essential to efficiency.

The security holders of the New Haven and its associated companies (as now constituted) number at least 60,000, and the employees about 90,000; with those dependent upon them they represent more than 600,000 people or about one-eleventh of the population of New England, and their rights and interests should be considered carefully by representatives in legislative halls and executive positions.

The six New England states have one-fourteenth of the population of the nation, one-twelfth of the national wealth and one-sixth of the bank deposits and consume one-eighth of the materials of manufacture. They must have first class railroads.

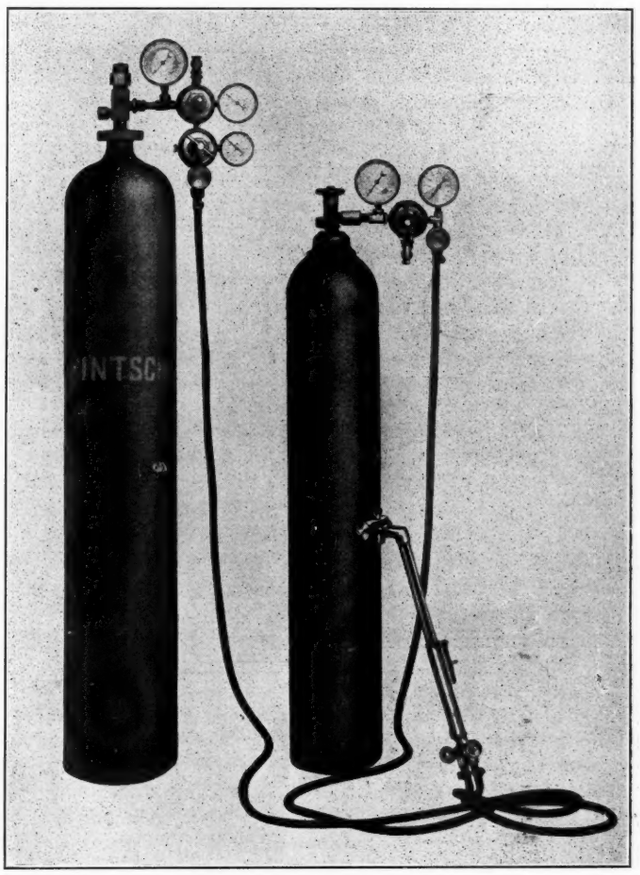
The time has come for holders of securities, employees, all true friends of New England to use their influence to help the transportation system by insisting upon helpful co-operation and fair treatment from all; and by insisting that rates for freight, passenger, mail and parcel post are sufficient to pay modern wages and taxes, give safe and adequate service, permit necessary additions and improvements to be made, and pay a good return to the holders of the securities.

METAL CUTTING AND WELDING WITH OXYGEN AND PINTSCH GAS

Flame cutting and flame welding processes have helped to solve many problems that have been created by the increased use of metal construction in railway equipment.

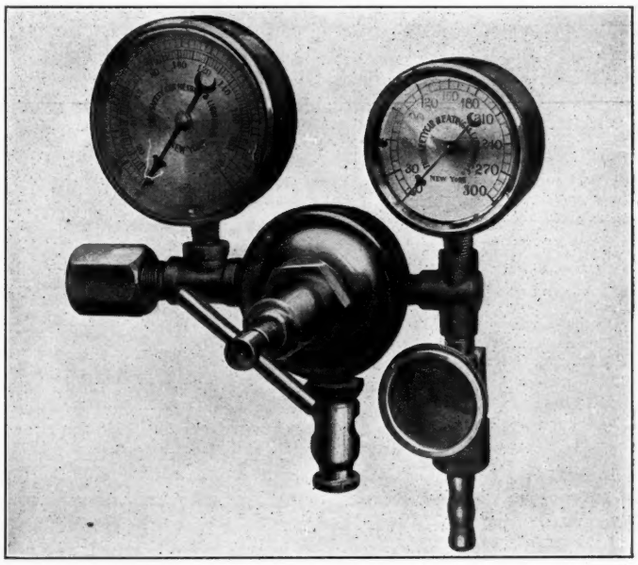
After much careful research and development work, a metal cutting and welding torch has been developed by the Safety Car Heating & Lighting Company, 2 Rector street, New York. The possibilities in the use of Pintsch gas for high temperature flame work, and the availability of this gas in the railway field was recognized as of value in the solution of the problem. Pintsch gas, on account of its high calorific value and characteristic stability, or resistance to pre-ignition, is well suited for high temperature flame work. The numerous Pintsch plants or supply stations, located throughout the United States, Canada and Mexico, supplying gas to the railroads for car lighting purposes, can deliver gas to the railway shops, or other points where needed, at a minimum cost and with minimum delay. A large number of the Pintsch supply stations are equipped to furnish Pintsch gas at 100 atmospheres pressure, so that the necessary quantity of fuel for cutting or welding can be furnished in the most compact form, which is another factor aiding in the low cost of metal cutting by this equipment.

The Oxy-Pintsch cutting and welding equipment is simple and compact. Pintsch gas, similarly to the oxygen used, can be supplied directly to the torch from either low pressure or high pressure flasks. The gas can also be distributed through the pipe lines operated by the Safety Car Heating & Lighting Company, to the points of consumption where practical. No expert knowledge is needed to properly handle the equipment. One of the illustrations shows the equipment complete, consisting of a high pressure Pintsch gas flask, an oxygen flask, pressure regulators, hose to convey the Pintsch gas and oxygen to the cutting or welding torch, and the Oxy-Pintsch cutting torch. The gas pressure is in all cases reduced to the proper cutting or welding pressure by means of suitable regulators. Pintsch gas is supplied in holders or flasks at either 12 atmospheres or 100 atmospheres pressure. The pressure reduction from the high pressure flask is made in two steps, insuring a uniform discharge pressure. The first pressure reduction is made to 14 atmospheres, the regulator for this reduction being equipped with a safety valve which releases the



Oxy-Pintsch Metal Cutting Equipment

pressure when 20 atmospheres is exceeded. The gas pressure required at the torch for cutting or welding does not exceed



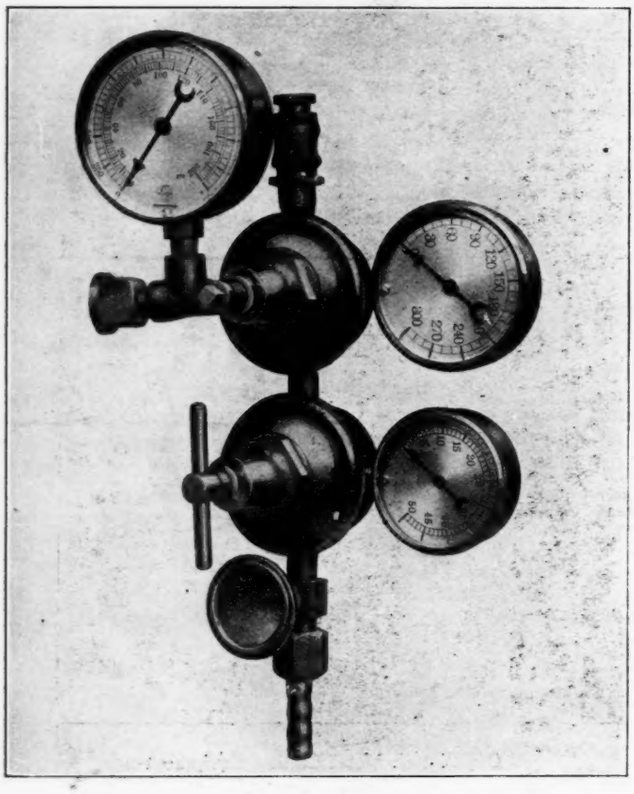
Oxygen Regulator

25 lb. per sq. in., which is obtained by means of the second pressure reduction. When Pintsch gas is taken from holders or pipe lines at pressures up to 14 atmospheres, an automatic

low pressure regulator is used. This regulator is designed to maintain any desired uniform pressure reduction.

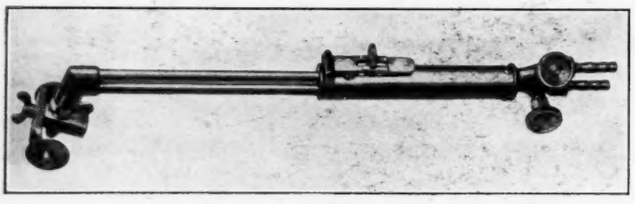
The oxygen is delivered at a uniform working pressure up to 150 lb. per sq. in. An automatic oxygen pressure regulator is employed, and is designed for the use of either high pressure or low pressure oxygen; it is equipped with a safety valve which releases when a pressure of 300 lb. per sq. in. is exceeded.

One of the engravings shows the Oxy-Pintsch cutting torch,



High Pressure Pintsch Gas Regulator

model A. There are but two hose connections, one for Pintsch gas and one for oxygen. The Pintsch gas and oxygen for the heating flame are controlled by two lever valves, making a quick and accurate adjustment possible. The oxygen for the cutting is controlled by a third lever valve which can be readily opened or closed, as required, by a slight pressure of the thumb. The cutting tip of this torch is of annular form, with the oxygen cutting jet located centrally. Since the cutting jet

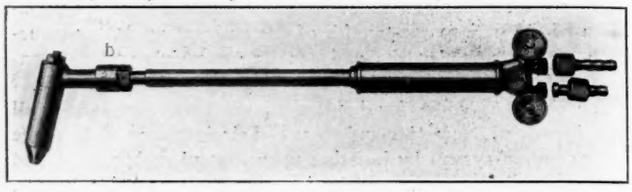


Model A Cutting Torch with Guide

is surrounded by the heating flame, it performs its proper function irrespective of the direction in which the cutting tip is advanced. This cutting tip also incorporates a novel design which causes the heating flame to develop inside of the tip. The heating flame, thus protected from the entrained air, is positive and effective in action, greatly facilitating adjustment for working conditions. The illustration shows the cutting torch equipped with a guide, the use of which is recommended wherever permissible as an aid to accurate cutting.

The model B Oxy-Pintsch combination cutting and welding torch is fitted with cutting and welding attachments, and has all the advantages outlined in connection with model A for metal cutting. The welding device illustrated can be used satisfactorily for repair work to castings or for welding steel or wrought iron of moderate thickness. In order to produce a high temperature non-oxidizing flame, advantage is taken in this design of the principle of pre-heating the Oxy-Pintsch gas mixture. This is accomplished by means of a pre-heater, incorporated in the tip of the torch, performing its function by internal combustion. The gaseous mixture is pre-heated in this manner to a high temperature, to which is added the temperature of combustion, resulting in an effective high temperature welding flame.

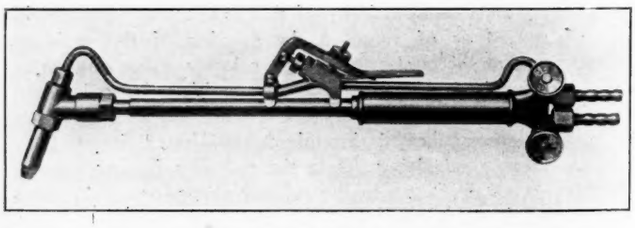
The cost of cutting metal with the Oxy-Pintsch cutting equipment as compared with the cost of cutting by other methods



Model B Welding Torch

demonstrates the advantage of this equipment in many branches of railway work. The saving effected is more fully appreciated by figures taken from actual service. In cutting with this equipment through 25 ft. of 18 in. channel used in car construction, where the average thickness of the metal was 15/32 in., and the length of the cuts varied from 7/16 to 1 in., the cost per lineal foot of cut was $.034, or a total cost of $.862. The actual time consumed, including shifting the beam, was 33 minutes. The oxygen consumed cost $.623, the Pintsch gas cost $.018, and the labor $.22.

The actual cost for similar work with the old process of chipping and drilling for the same total length of cuts was $4.66. The cost of cutting with the Oxy-Pintsch equipment was



Model B Cutting Torch

thus less than one-fifth the cost of cutting by drilling and chipping.

The following table serves to illustrate what has been accomplished in cutting steel with the Oxy-Pintsch cutting equipment. The results given in this table were obtained under service conditions by means of hand cutting with the model A torch without a guide. Considerably better economy can be obtained where mechanical guiding is permissible:

Tip number	Thickness of steel	Pressure of oxygen, lb. per sq. inch	Pressure of gas, lb. per sq. inch	Cu. ft. of oxygen per foot of cut	Cu. ft. of gas per foot of cut	Time in minutes per foot of cut
1	¼ in.	15	20	.53	.15	.70
1	½ in.	25	20	1.15	.20	.85
1	1 in.	35	20	1.80	.30	1.25
2	2 in.	40	20	4.10	.40	1.65

THE COAL TRAFFIC OF FOUR LEADING ENGLISH RAILWAYS.—Returns for 1913 show that in the year just past the North Eastern carried 35,621,178 tons of coal; the Midland, 27,338,480 tons; the Great Western, 26,278,234 tons, and the London & North Western, 32,784,124 tons.

Maintenance of Way Section

Systematic Scrap Trains

While a net saving of over $38,000 will not be secured from the operation of a scrap train over every division, as was done on one division of the Illinois Central, a surprisingly large amount of surplus and scrap material will be found on any division if a thorough investigation is made. Although many roads operate scrap trains monthly, these are not entirely efficient without continued, careful supervision. The directing of concentrated attention on this subject at frequent intervals will materially reduce the amount of material held on hand and effect large economies, the savings being not alone in the value of the material recovered, but also in the moral effect on the employees themselves.

Statistics of Rail Production

The statistics of rail production for 1913 which are published on another page show an increase of over 20 per cent. in the production of open hearth rails and a decrease of over 25 per cent. in Bessemer rails. As a result the ratio of open hearth to Bessemer rail production has increased from 2 to 1 in 1912 to 3 to 1 in 1913. The production of open hearth rails has steadily increased since 1903, when they were first produced in any appreciable quantity, while that of Bessemer rails has steadily decreased from the high figure of 3,791,459 tons in 1906 until now it is less than 22 per cent. of that figure. The production of alloy rails has also shown a noticeable decline since 1910, and particularly in the last year. The weight of rail rolled has increased materially. In 1913 65 per cent. of all the rails rolled were of 85 lb. section and over, as compared with 59 per cent. in the previous year; 49 per cent. in 1906, and 25 per cent. in 1900.

Diversity of Maintenance Problems

Many of the problems encountered in the maintenance of way department are common to all roads. Because of the widely varying local conditions, others are distinctly special in their character. An example of the latter kind is the construction of nearly three miles of snow sheds within a distance of nine miles on the Great Northern main line through the Cascade mountains where an equal amount of snow sheds was already in service. The construction of these new sheds is described elsewhere in this issue. Entirely aside from the fact that it was necessary to place over 25,000,000 ft. B. M. of timber and 55,000 cu. yd. of concrete from the main line without interference with traffic within the short working season of six months, the necessity for six miles of snow sheds within a total distance of nine miles, illustrates a problem with which the man on the prairies does not have to contend. While not directly applicable to problems generally encountered, a description of such construction should nevertheless be of wide general interest. The lack of appreciation that men differently situated often have of each other's problems was illustrated by a criticism received recently of a discussion of the best means of unloading rails from flat cars. The man making the criticism was an experienced maintenance officer of a prominent eastern road who condemned the loading of rails in stock cars as very bad practice, stating that this was never done on his road. He was, however, unfamiliar with the fact that many western roads load rail into stock cars regularly, as it goes in the direction of the empty stock car movement, and the increased difficulty of unloading this rail out on the line is frequently far more than offset by the reduction in car mileage. Thus, a practice which may be entirely wrong on one line, may, under other conditions be entirely justified on another road.

Variable Rates for Skilled Laborers

Because of the wide variety of duties carpenters or other skilled maintenance of way employees may be called upon to perform, it is difficult to compare their output of work with that of similar men in other industries. For that reason it is difficult to maintain a high standard of efficiency. The losses caused by the employment of cheaper and less efficient labor are not as directly evident and lower wage scales come to be regarded as standard. It is only when some special piece of work must be done in a manner calling for a high class of workmanship that the deficiencies are evident. The frequently repeated statement that the cheapest labor may be the most expensive in the end, applies with especial emphasis to skilled labor. However, this should not be accepted as a justification for a general advance in schedules without a careful study of the existing conditions. The general adoption of a flat rate in railway service and the difficulty of securing a special rate for a certain number of skilled men, tends to lower the efficiency of the entire force. At the same time an increase in the authorized rate is frequently accepted only as a chance to increase the pay of the men already in service instead of enabling more efficient men to be secured from other industries. The success of a variable rate depends upon the judgment exercised by the officer in charge.

A COAL-TAR-CREOSOTE MIXTURE

THE most important problem before the wood preserving industry today, affecting railroads and commercial plants alike, is the commercial shortage of high grade creosote oil. Intimately connected with this is the question of the advisability of adding refined coal tar to low grade creosote oils to increase the supply of available oils. Therefore the paper by Messrs. Von Schrenk and Kammerer on "The Use of Coal Tar in the Creosoting Industry," published on another page, is very timely. In spite of the large quantities of timber treated with zinc chloride and other materials, two-thirds of all the timber is treated with creosote. Of 83,666,490 gal. of creosote required for this purpose in this country in 1912, only 37 per cent. was domestic oil, the rest being imported, mainly from Germany and England. While the amount of creosote produced in this country is increasing, the demand is increasing at almost the same rate.

The specifications for creosote oil most generally accepted are those of the American Railway Engineering Association. But not all of the creosote produced in this country or imported comes within these specifications for No. 1 oil, and there are considerable quantities of the lower grade oils available. Because of the uncertainty regarding the quality of these low grade oils, many railroads have specified that the No. 1 grade oil should be used exclusively on their work. One speaker stated upon the floor of the convention of the American Railway Engineering Association last month, that he knew of at least eight creosoting plants which were forced to shut down last summer because of inability to secure this grade of oil. Because of the shortage of this high grade oil and the necessity of treating increasingly large quantities of timber each year, there has gradually crept into the industry within the past six years, the practice of mixing refined coal tar with the lower

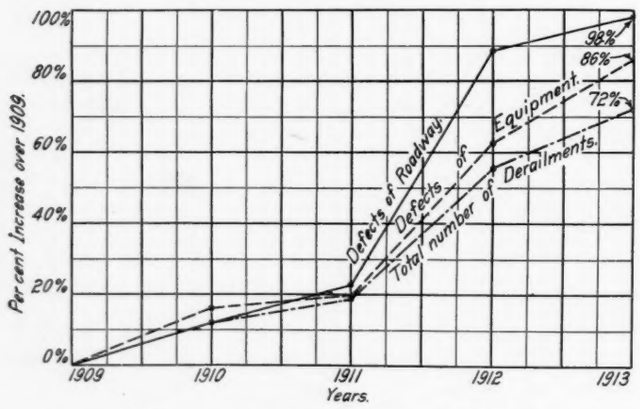
grades of creosote oil to improve the quality of these poorer oils and make them acceptable. In the article referred to above Messrs. Von Schrenk and Kammerer estimate that about 40 per cent. of all creosote oil used in 1912 was such a mixture, and that approximately 24,500,000 ties have been treated with this mixture in plants where this practice was openly allowed. In addition, large quantities have been used secretly under specifications requiring No. 1 high grade oil.

It is this latter practice which has brought the mixture into disrepute, and has created the general impression that the refined coal tar is added as an adulterant. On the contrary, the practice is a commercial expedient to improve the available oil because of the scarcity ot high grade creosote. By bringing this practice out into the open, as Messrs. Von Schrenk and Kammerer have done in this paper, it will be placed in its true light, serving to reduce the misrepresentation in some quarters, and primarily to enable the purchaser to specify this mixture intelligently where the high grade oils are not available. From the evidence at hand, it would appear that the use of the mixture need not be condemned because of the lack of preservative qualities, and that as a commercial necessity its use may be entirely justified.

Briefly, Messrs. Von Schrenk and Kammerer recommend that No. 1 high grade creosote oil should be used in all cases where it is possible to secure it in sufficient quantities. But many railroads which are unable to secure No. 1 oil at all can secure No. 2 or No. 3 oil. In such instances the authors believe that the lower grade oils can be used with the addition of refined coal tar, probably at a lower cost than where larger quantities of the same inferior oils are used alone. Such a mixture should, however, only be used under the immediate direction of the railroad companies, and with their full knowledge.

A STUDY OF DERAILMENT STATISTICS

A COMPARISON of the accident reports of the Interstate Commerce Commission for recent years will reveal conditions with reference to derailments worthy of careful consideration by all railway operating officers, and especially by those in charge of maintenance of way. The last period of relatively few derailments was the fiscal year ending June 30, 1909. Since that date, as shown in the accompanying curve, the number has rapidly increased, until the year ending June 30, 1913, showed



Curve of Increase in Number of Derailments Since 1909

an increase of 72 per cent. over 1909 and a number considerably greater than in any preceding year. The number of derailments due to defects in equipment in 1913 was 86 per cent. greater than for 1909, while those due to defects of roadway increased 98 per cent. Thus, while the total number of derailments has increased much faster than the traffic during the past four years, the number of those due to defects of roadway has increased at an even greater rate.

When it is difficult, as is frequently the case, to determine certainly the primary cause of a derailment, there is always a tendency to shift the responsibility from one department to another. With reference to those charged to defects of roadway, alone, however, it is plainly evident that the maintenance department must assume full responsibility. The magnitude of this problem is shown by the fact that last year there was a total of 1,956 derailments due to defects of roadway, resulting in the death of 70 people and the injury of 2,222 persons, in addition to causing a property loss estimated at $1,570,225.

It is true that the increase in the number of derailments of this class is undoubtedly due to some extent to the restriction of expenditures for maintenance purposes made necessary by the present conditions in the railway industry, but this should cause even greater precautions to be taken to insure safe operation. The accident record of American railways as a whole is far from creditable, and every effort should be made to reduce the number of accidents, instead of allowing them to increase as they are now doing. These statistics should provide food for serious reflection on the part of the maintenance department.

NEW BOOKS

Railroad Curves and Earthwork (fifth edition). By C. Frank Allen, professor of railroad engineering, Massachusetts Institute of Technology. Size 4 in. by 7 in., 283 pages, illustrated, morocco binding. Published by McGraw-Hill Book Company, New York. Price $3. Also bound in two separate volumes, "Railroad Curves and Earthwork," $2, and "Field and Office Tables," $2.

The fifth edition of Allen's "Railroad Curves and Earthwork," which has just been published, bears the evidence of extensive revision. In some cases this has been merely a matter of clearing up points that experience has shown could be improved, although a considerable amount of new material has been added and a few of the less important problems omitted. The chapter on turnouts has been almost completely rewritten to make it accord with the important progress that has been made in railroad practice as regards turnouts in recent years. The chapter on spirals has been largely rewritten and adapted to the use of the American Railway Engineering Association standard spiral and a few important changes have been made in the chapter on earthwork. Most of the changes made in this edition are directly in line with the author's policy of adapting the work to the requirements of the practicing railway engineer. The work has also been made more adaptable by its presentation in two forms, one with both parts in one volume and one with separate volumes uniformly bound, the first covering, "Railroad Curves and Earthwork," and the second "Field and Office Tables."

Steel Bridge Designing. By Melville B. Wells, associate professor of bridge and structural engineering, Armour Institute of Technology. Size, 6 in. by 9 in., 260 pages, illustrated, 26 plates, cloth binding. Published by the Myron C. Clark Publishing Company, Chicago. Price $2.50.

In addition to the material on bridge designing which is usually found in a text book of this character, the author has included three introductory chapters covering the preliminary work necessary before bridge design can be undertaken; the organization and methods of procedure in a bridge shop; and general considerations in the design of rivets. Later in the book a chapter on strength of materials is also added which includes elementary principles which it is usually assumed a student in bridge design has learned in previous courses. Seven chapters are devoted to detailed designs, one to shop drawing and one to bibliography. The designs include a roof truss, riveted truss highway bridge, plate girder railroad bridge, riveted truss railroad bridge and a pin connected bridge. The general specifications for steel railroad bridges of the American Railway Engineering Association are reprinted and a set of 26 plates is included to show standard working drawings of actual bridge designs. An index is added to facilitate the use of the book for reference purposes.

Letters to the Editor

HINTS ON EFFICIENCY AND ORGANIZATION IN MAINTENANCE

Neodesha, Kan., March 12, 1914.

To the Editor of the Railway Age Gazette:

To promote efficiency is a great slogan today. At the same time the head of each sub-division of maintenance work is not given the opportunity to operate as efficiently as he could if he was properly organized and knew what his future allowance would be. It has been a practice with many railroads to do the greater volume of maintenance work in the late fall and early winter. This is a mistake. We should be in shape to start on bridge renewal by April 1; the tie renewals should begin at this time, and the bulk of the bridge work could be completed by December 1, then a reduction in forces could be made until April 1. From December 1 to April 1 light repairs could be made with small gangs, getting the structures in shape for the next year's renewals.

If the material could be furnished in this manner, I believe the efficiency of maintenance could be raised to a higher standard. There are many other ways in which the efficiency can be greatly increased. We are required to do many things at once, without any consideration as to whether or not they are the proper things to do, and when something else would have given more service, and would have been what was needed for the future. Conceit is a good thing, but it does not always promote efficiency. It is a good thing to have ample confidence in one's own ability, but he should not think he is the only practical or scientific man on the railroad. We can be taught many things every day we live by persons to whom we have never given any consideration as teachers. The respect and good will of all concerned produce efficiency.

A good word to all one has working under him produces efficiency. Men are all human. They enjoy a friendly word, and it encourages them to do the things in the way they should be done, and in line with instructions. Organization is a great lever of efficiency, but what does it mean? It means co-operation. One must have the co-operation of all concerned, and to have this he must have their respect. One can gain this by being firm and courteous, by educating them all he can in a friendly way; this will repay him four-fold in helping to accomplish this work, and at the same time it will educate him in return.

M. D. Gibbs,
General Foreman of Bridges and Buildings and Water Service,
St. Louis & San Francisco.

THE OPPORTUNITIES OF A GENERAL ROADMASTER

Kansas City, Mo., February 20, 1914.

To the Editor of the Railway Age Gazette:

Under a divisional organization the superintendent is in direct charge of operation of his respective division. Upon his staff are the three principal heads of the respective departments or branches, the trainmaster, the general roadmaster or division engineer and the master mechanic. The general roadmaster is in charge of all structures and tracks, therefore a technical as well as practical training is essential. He must also have executive ability to properly direct the work of various employees under him.

Under the present high cost of operation which the railroads are now experiencing, it is necessary that expenditures for his department be reduced to a minimum. Someone has said that a civil engineer is a man who can make one dollar do the work of two. It is therefore necessary that he show his fitness especially in this manner by reducing the expenditures to a minimum and enabling the railroad to receive full benefit for every dollar expended.

He must constantly supervise the work of the track forces, seeing that due attention is given to proper maintenance, and that the roadmasters are furnished with proper and a sufficient amount of tools and material. This necessitates that he be thoroughly versed in the requirements of each roadmaster and know the physical condition of their track as well as each local condition.

The material question is one of the greatest problems confronting the maintenance of way department. The advisability of keeping the stock balance as low as good maintenance will warrant can be readily seen, as material will not deteriorate as much if allowed to remain under cover at the division storehouse, or still better at the manufacturer's plant, as it will out on the line. Here the general roadmaster is specially valuable, as he can more than save his salary each month by carefully scrutinizing each roadmaster's requisitions or by transferring surplus material from one roadmaster's territory to another. He should also bear in mind that permanent improvements are far better than temporary ones. While it is true that lining and surfacing track form the greater part of a section gang's work, a little ballast here and there and the prompt removal of decayed and broken ties will reduce this class of work to quite a great extent, and every dollar saved in lining and surfacing is one dollar in the stockholders' pockets

In transferring material from one roadmaster's territory to another due consideration should be given to the transportation cost, bearing in mind the value of the car and the cost of moving it, as the average cost is in the neighborhood of 30 cents per 100 gross ton miles and the car is worth 34 cents per day; a foreign car 45 cents per day. Thus it can be readily seen that care should be given to the handling of company material and to the prompt unloading of cars, as the cars must not be used for temporary storage structures.

As Wellington so ably states, the business of a railroad is "to sell all the transportation possible; to dispense with all the train miles possible, and to reduce cost of running trains, per mile." The general roadmaster therefore should be well posted regarding traffic conditions, as a few slight changes in the arrangement of tracks may enable a large saving to be obtained at a small cost. He should be energetic and on the alert ready to meet any condition which may arise at a moment's notice. His motto should be: "Every Dollar Saved is a Dollar Earned."

H. G. Olmsted.

Refrigerator Car Service in Russia.—About one-sixth of the total amount of butter exported from Siberia is handled by an association known as the League of Siberian Dairy Unions. This body undertook last year a comprehensive series of observations of the conditions under which the butter was carried from West Siberia to the shipping ports. The traffic is carried in ice-chilled cars, and as the majority of the trains passed through Windau, each train was carefully inspected there on its arrival. Three types of cars are in use. The old type has the doors at one end and the ice reservoir at the other, but owing to bad insulation and cracks it is easy for the outside air to enter. The new types, which are classified as small and large, have the door in the side, with an ice space at each end, and these cars are unquestionably more satisfactory, as was shown by the temperature of the vehicles on arrival at Windau. The supply of ice at stations en route leaves very much to be desired. At some places the loading is perfunctory, or the stocks are insufficient, and the ice is handled in a distinctively primitive fashion, often becoming dirty and contaminated before use. Convicts are used as loaders at one point. The loading, too, is so slow that train delays of from one to five days are common. The League, which is desirous of improving conditions, has lately been insisting on the need for cooling the butter before it is loaded for transport by rail. At present much of it is first carried a long distance by road, and then stands about in the sun before loading. Pre-cooling experiments have given excellent results, and the League is about to erect a number of cold-storage depots at various points to ensure the loading of the butter at a sufficiently low temperature.

Re-Erecting the St. Francois River Bridge, Quebec

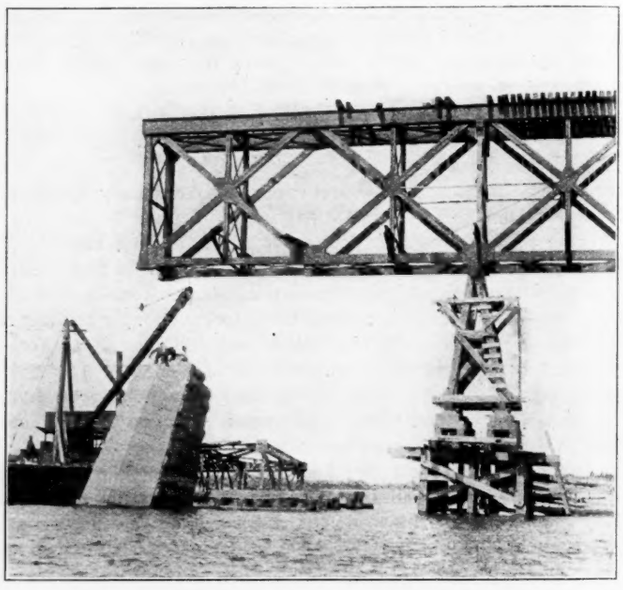
Replacing Three 125 Ft. Spans on New Piers After Being Thrown into Stream by Foundation Failure

On the evening of March 22, 1913, two piers and three spans of the Quebec, Montreal & Southern bridge over the St. Francois river in the Province of Quebec, Canada, were carried out by ice. Starting at the village of St. Francois-du-Lac on the west side of the river this bridge crosses the river at the head of navigation and is composed of a pile trestle 970 ft. long, a 60 ft. steel deck girder span, seven riveted steel deck trusses,

View from West End on the Day After the Spans Fell

each 125 ft. long and 24 ft. deep from base of rail to bridge seat; a 30 ft. steel deck girder span and 180 feet of pile trestle, ending at the village of Pierreville on the east side of the river. This bridge was built in 1899 and 1900 by the Quebec Southern Railway, which company was afterwards merged into the Quebec, Montreal & Southern Railway. The crossing is at right angles to the stream with the piers parallel with the flow of the river. The stream is subject to wide variations in height and, in winter, forms very heavy ice. A short distance below the bridge, three islands lie in a bend of the river forming a barrier to direct flow.

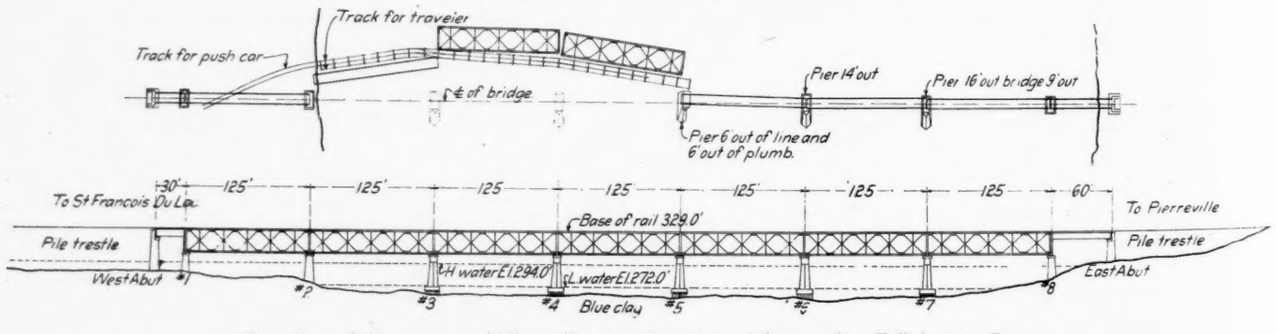
About the middle of March, with the river near its maximum height, and covered with 40 in. of hard ice, a diagonal crack developed in the ice, starting from the west shore just above the bridge and extending across the river to a point one-fourth mile above the bridge. On March 22 the river rose to its maximum height, loosening the ice along the banks and leaving clear water at the head of the islands. The ice above the bridge started to move, following the diagonal break until it landed against the west bank when the impact and pressure started the lower field, shoving it diagonally across to the east bank, perpendicular to the line of the break, until the movement was stopped by an ice gorge at the head of the islands. This movement exerted a heavy pressure on the sides of the bridge piers and overturned the third and fourth; shoved the fifth pier six feet out of line and plumb and moved piers six and seven, each about eighteen inches. The maximum pressure was exerted at the west side of the river, pier 3, the first river pier falling first, quickly followed by pier 4 and the displacement of piers 5, 6 and 7. Pier 3 carried with it the second and third truss spans and this probably assisted in the failure of pier 4 which carried with it the fourth span of the truss. The fall of the trusses in no way



Manner of Supporting Span During Removal of Pier 5

affected the failure of pier 5, as it was shoved back under the span so that it overhung the pier 24 in.

None of the fallen spans were seriously damaged. The ice was within five feet of the lower chords and was of sufficient strength, according to eye witnesses, to carry all three spans; the second span landed upright while the third and fourth spans



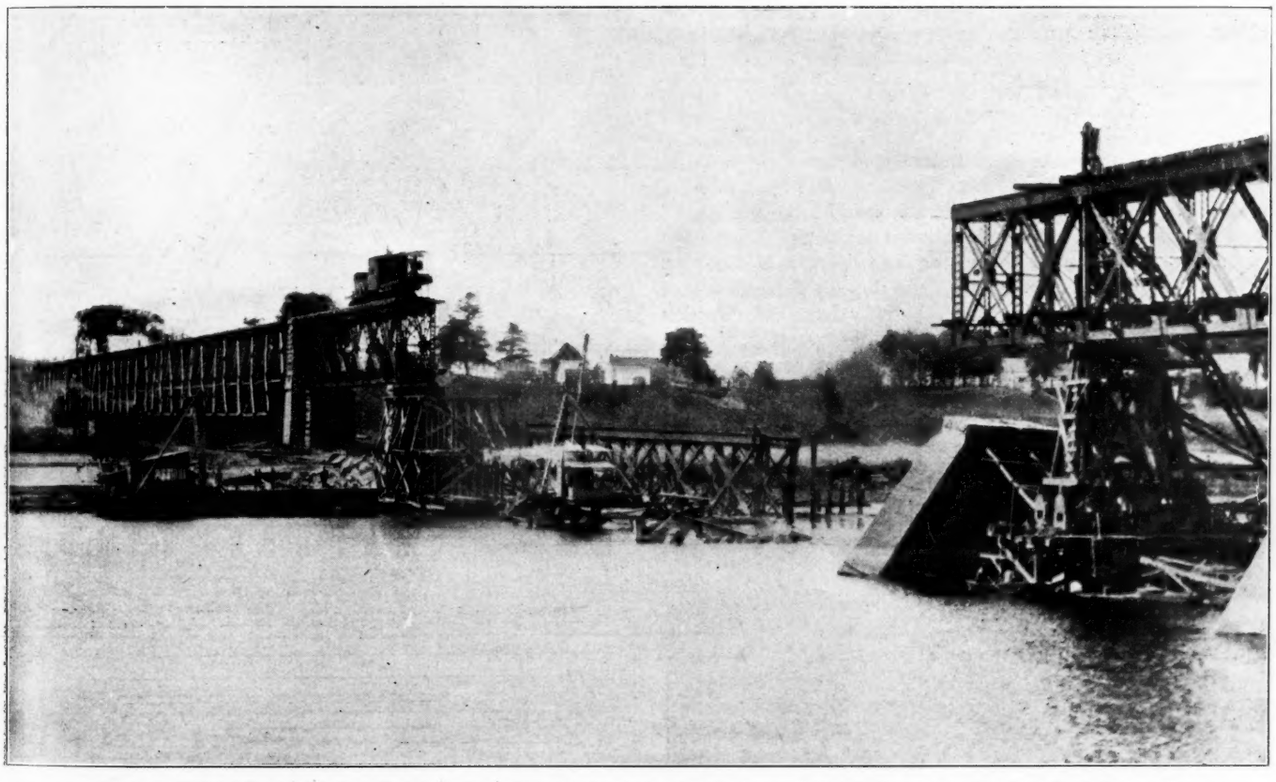
Elevation of Structure and Plans Showing Location of Spans after Falling into River

turned on their sides. All three remained on the ice for several hours, the movement of which did not exceed 100 ft., and then sank slowly, landing in the positions shown on the accompanying sketch.

Owing to the continued high water and ice, it was impossible

to begin the reconstruction of the bridge until the middle of May when pile driving was started for the false work for the replacing of the three fallen spans. At the same time the work of supporting and saving the span overhanging pier 5 was undertaken. This was accomplished by sinking a crib 15 ft. by 30 ft. under the span and erecting thereon a timber bent supporting the truss at the second panel point, with timber struts between the top and bottom chords. The bent was provided with jacking blocks to raise the span to the proper level, clear of the pier. The center of gravity of the leaning pier fell just within the base and in order to provide against possible overturning, two sets of braces were placed between the crib and the pier with one set running from the crib to pier 6 as kicking braces. The span was carried on this temporary support until the pier was taken down to the water line. When this was accomplished, the permanent false work was erected under the first panel point of the truss. This was provided with double caps between which and the timbers under the span, 14 six-inch hardwood rollers as a form to bring the concrete base above low water. Upon this concrete base the pier was erected, of cut stone facing, backed and filled with boulders from the river and grouted.

All of the river piers, 3, 4, 5, 6 and 7, were renewed in concrete. An exhaustive study was made before final decision was reached as to the rebuilding of piers 6 and 7. These piers were 14 in. out of line and about 12 in. out of plumb and the possibility of saving them by underpinning and jacketing with concrete was considered. Cofferdams were driven of proper size for rebuilding if found necessary and when pumped out disclosed such serious difficulties that all estimates pointed to the economy of their entire removal and reconstruction. The design of the piers is shown in the accompanying drawing in which the new piers are shown in full lines and the old in dotted lines. The foundations of the new piers were carried from 6 to 8 ft. below the bed of the river into hard blue clay of an unknown depth. Cofferdams of 9 in. Wakefield sheet piling were driven for each pier to a uniform penetration of 15 ft. and excavation



General View of the Opening With Falsework Started for Re-Erection of Spans. Span 2 Lying in River

were placed upon which the span was moved six feet back into line.

The removal of the two fallen piers could not be commenced until June 1. Enough of this material was removed by divers, working from a derrick scow, to permit clearing the site for cofferdams for the new piers and to continue the driving of piles for false work. The stone was loaded on scows, floated to shore and used as riprap around the two shore piers, 2 and 8.

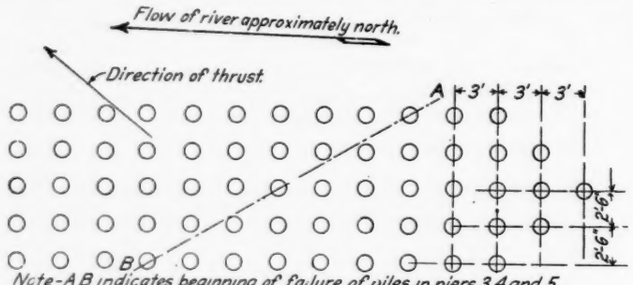
The original piers were constructed by driving 64 piles for each pier; these were cut off at the level of the bottom of the river, using a submarine saw. A timber crib was constructed on shore, floated into position over the piles and sunk upon them by loading with concrete. These cribs consisted of two layers of 12 in. by 12 in. timber, drift-bolted together with ¾ in. drift bolts, 18 in. long, with the sides of the same sized timber 3 ft. high. These cribs were not fastened to the piles in any manner, depending solely on friction to prevent lateral movement. They were held in position over the piles by poles, 4 to 6 in. in diameter, driven close together around the entire crib and further used therein was carried 18 in. below finished grade before any piles were driven. All the old piles under the piers which were not broken or too much out of plumb, as described later, were cut off to the new level two feet above the bottom of footing and were used as bearing piles in the new piers, additional piles being driven to replace any defective ones and to bring the total vertical bearing piles under each of the two piers to 131. Twenty-one additional piles were driven in the down stream end of each pier at an angle of 60 deg. as "kickers" or braces against lateral movement from ice pressure. All piles were cut square and embedded with two feet of butts in concrete footing. Forty-five-foot piles were driven, this being the longest that head room under the bridge would allow.

The piles under the old piers were very firm, a number in each of the cofferdams being tested with a 15 ft. drop of a 2,800-lb. hammer with no movement under five blows. One pile in cofferdam 5 was tested out and moved two inches under the tenth blow and was then driven four feet further by 40 additional blows.

The failure of these piers was wholly due to faulty construc-

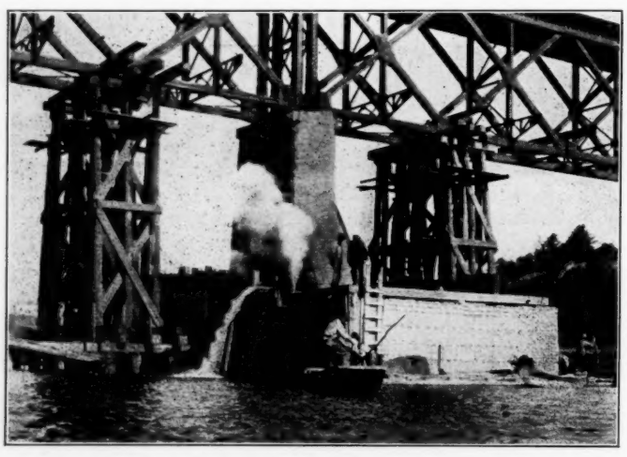
tion. The piles were cut off at or near the bed of the river and no provision was made against the scouring action of the water which, at times, is very swift. This is especially the case when this river is rising and the St. Lawrence, into which it flows six miles below the bridge, is falling. The evidence at piers 5, 6 and 7 where the cofferdams were pumped out previous to the removal of the old construction, shows scouring to the extent of two to three feet under each pier; this was partly filled in with gravel but in each pier the bottom of the crib was from 18 in. to 2 ft. above the present bed of the river.

A sketch of the spacing of the piles under the old piers is



Location of Piles Under Failed Pier

shown herewith. In each of the piers 3, 4 and 5 the line "A-B" shows the commencement of pile failures due to the thrust from the overturning action of the ice against the top of the pier. At this line the piles were from eight to ten degrees out of plumb, inclining almost perpendicularly away from the direction of this line. This inclination increased with each row of piles, until in pier 5 the maximum at the northeast corner was 45 deg. In piers 3 and 4, which were overturned, all piles below this line were broken at an average depth of six feet below the bottom of the crib, while those near the line cracked and splintered and those at the lower end broke almost squarely across. Of the cribs of these two piers, the northeast corners were buried eight feet below the present bed of the river and lay with their bottoms inclined up stream at an angle of about 60 deg.

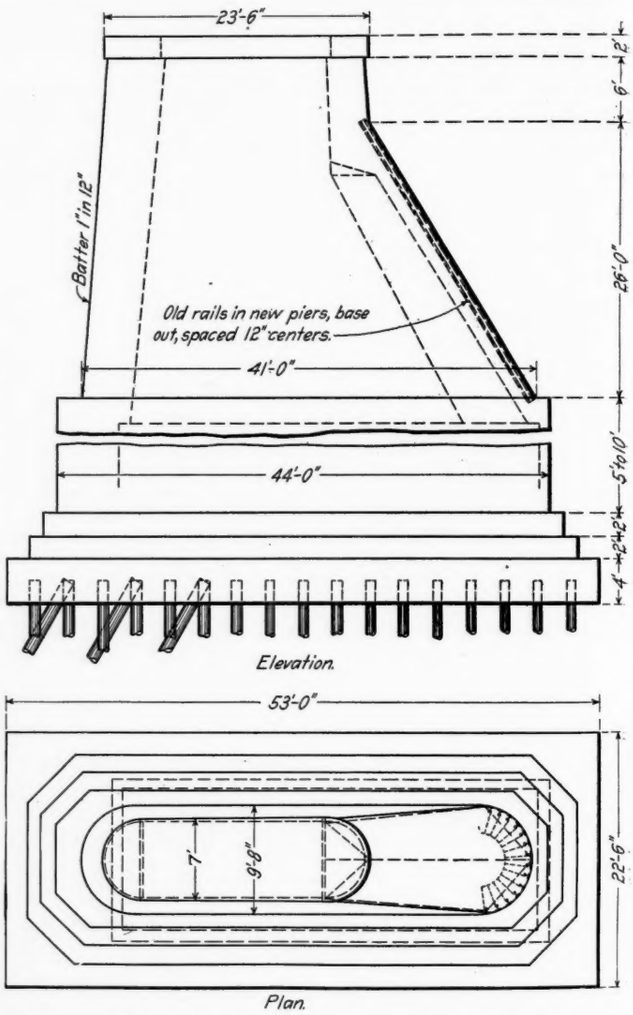


Method of Supporting Old Spans While Old Pier Was Being Replaced With a Heavier One

In piers 6 and 7 the whole body of the piles, except a few at the up stream end, shoved out of line with the movement of the piers. There was no evidence of the cribs having slipped on the pile heads and all piles were displaced so that the heads, which were originally level had an inclination of five degrees.

The reconstruction of the piers presented no serious difficulties. The bank on each side of the river afforded good working space with ample room to store materials. Concrete was mixed on shore and run out to work in buckets over a temporary construction trestle on the up stream side of the piers and was handled at the forms by derricks located on the corners of the cofferdams. Steam for pumping and for operating the steam pile hammers was provided by a three-inch main, carried across the river with a boiler on each shore and one on the crib at pier 5 as sources of supply. Very little trouble with water was experienced in any of the cofferdams except No. 7. In driving this, boulders were encountered at the up stream end and both corners opened up. These were closed by divers spiking planks on the outside and puddling with sand bags and clay.

When the water had fallen sufficiently to allow an examination of the fallen trusses, it was found they were practically intact, all three lying perfectly straight in the bed of the river. All the members were in good condition with the exception of the two



Plan and Elevation of New Pier Showing Outlines of Old Pier

end posts of span 2-3 and the bottom lateral systems and three end sections of the lower chord of spans 3-4 and 4-5 (those lying on their sides) which had been damaged by floating ice.

It was decided to pick these spans out of the river and re-erect them, replacing the damaged members. Each truss consists of five panels of 20 ft. each, the top chords in five sections matching the panels and the bottom chords in three sections. These were all cut apart into panel lengths and numbered for re-assembling. A light pile trestle was driven along the down stream side of the first and the up stream sides of the second and third spans. On this was run a six-ton hand-power traveler by which the members were picked up and loaded on push cars running on a track on the trestle and extending out under span 2-3 where

they were picked up by a traveling derrick and re-erected on the false work. Timber pony trusses were erected to carry the end panels over the cofferdams during erection and these were reinforced by additional trusses inside the steel work when the bridge was put into service for regular traffic.

The traveling derrick by which re-erection was accomplished was a makeshift as no steam derrick was available. It was rigged with a Marion steam shovel, with boom and operating chains removed, as the motive power for traveling and for hoisting. The cables from a six-ton swing-boom derrick, mounted on a steel frame flat car, in front of the shovel, were carried to the hoisting and swinging drums of the engines. This outfit gave very satisfactory service, the main difficulty being experienced in lowering under load as the steam brake on the engine was not adapted to this service. It was found to be impracticable to handle the load and boom at the same time. The erection of the steel progressed rapidly, and was accomplished in two months' time. It was completed on August 7, from which time the bridge has been in service, although regular passenger service was not resumed until August 20, when the fall schedules went into effect.

The Quebec, Montreal & Southern Railway is owned by the Delaware & Hudson, and work was handled under the direction of George H. Burgess, chief engineer; F. D. Anthony, construction engineer; and the writer, special resident engineer. The substructure work was done under contract by the Foundation Company, Limited, of Canada. The superstructure was taken from the river and re-erected by James Finely, contractor. All false work was placed by railroad forces under E. L. Gibson, division engineer.

PRODUCTION OF RAILS IN THE UNITED STATES IN 1913

The Bureau of Statistics of the American Iron and Steel Institute has received from the manufacturers statistics of the production of all kinds of rails in the United States in the calendar year 1913, which are given below.

The production of all kinds of rails in 1913 amounted to 3,502,780 tons, against 3,327,915 tons in 1912, an increase of 174,865 tons, or over 5.2 per cent. Included in the total for 1913 are 195,659 tons of girder and high T steel rails for electric and street railways, against 174,004 tons in 1912 and 205,409 tons in 1911. The maximum production of all kinds of rails was reached in 1906, when 3,977,887 tons were rolled, or 475,107 tons more than were produced in 1913.

The production of open-hearth rails in 1913 more than tripled the output of Bessemer rails, amounting to 2,527,710 tons, against 2,105,144 tons in 1912, an increase of 422,566 tons, or over 20 per cent. The maximum production of open-hearth rails was reached in 1913. The year of next largest production was 1912. The production of Bessemer steel rails in 1913 amounted to 817,591 tons, against 1,099,926 tons in 1912, a decrease of 282,335 tons, or over 25.6 per cent. The maximum production of Bessemer rails was reached in 1906, when 3,791,459 tons were produced.

In 1913 the production of rails rolled from steel made in electric furnaces amounted to 2,436 tons, as compared with 3,455 tons in 1912 and 462 tons in 1911. In 1909 and 1910 small quantities of rails were also rolled from electric steel, but these rails were included with the Bessemer and open-hearth rails reported for these two years.

In 1913 the production of steel rails rolled from new seconds, defective new rails, crop ends, old steel rails, etc., including renewed rails, amounted to 198,836 tons, against 161,976 tons in 1912. Of the total in 1913, 43,793 tons were rolled from new seconds, etc., against 42,586 in 1912, and 155,043 tons were renewed rails or were rerolled from old steel rails, against 119,390 tons in 1912.

No iron rails were rolled in 1912 or 1913. In 1911 the production was 234 tons, all weighing less than 45 lb. to the yd., against 230 tons in 1910.

In 1913 nearly 29.9 per cent. of the rails weighing less than 50 lb. to the yd., nearly 48.7 per cent. weighing 50 lb. and less than 85 lb., and over 87.2 per cent. of the rails weighing 85 lb. and over were rolled from open-hearth steel, while in the same year nearly 41 per cent. of the rails weighing less than 50 lb. to the yd., over 44.8 per cent. of the rails weighing 50 lb. and less than 85 lb. and nearly 12.1 per cent. of the rails weighing 85 lb. and over were rolled from Bessemer steel. In addition in 1913 over 29.1 per cent. of the rails weighing less than 50 lb. to the yd., over 6.5 per cent. of the rails weighing 50 lb. and less than 85 lb., and less than 1 per cent. of the rails weighing 85 lb. and over were rolled from electric ingots and old steel rails or were renewed rails.

Included in the 3,502,780 tons of steel rails rolled in 1913 are 59,519 tons of rails rolled from alloy-treated steel, as compared with 149,267 tons in 1912. The following table gives the production by processes of alloy-treated steel rails since 1909, in gross tons:

	Open-hearth and electric	Bessemer	Total
Titanium steel rails	30,653	17,002	47,655
Manganese, copper and nickel	2,914	8,950	11,864
Total for 1913	33,567	25,952	59,519
Total for 1912	40,393	108,874	149,267
Total for 1911	38,539	115,450	153,989
Total for 1910	27,389	229,935	257,324
Total for 1909	13,696	35,699	49,395

The following table gives the exports of steel rails to all countries during the last five calendar years, in gross tons. The imports of steel rails in 1913 amounted to 10,408 gross tons, as compared with 3,780 gross tons in 1912:

	1909	1910	1911	1912	1913
Canada	32,988	25,341	88,047	133,351	161,971
Cent. America and Brit. Hond.	22,749	17,927	14,839	15,935	12,418
Mexico	65,838	63,082	35,152	32,402	13,907
West Indies and Bermuda	26,981	41,029	35,892	47,889	32,954
Argentina	101,943	64,370	57,385	13,574	41,181
Brazil		18,400	28,601	45,951	41,215
Other South America		16,384	41,596	54,465	33,525
Japan	9,823	17,977	49,775	54,247	20,820
Other Asia and Oceania	38,325	80,080	57,550	31,387	90,405
Other countries	893	8,590	12,037	17,272	12,157
Total	299,540	353,180	420,874	446,473	460,553

CONCRETE FENCE POSTS

On the average, one yard of sand or gravel is sufficient for 40 concrete fence posts and one barrel of cement used in a 1:4 mixture will make 24 posts. One ton of ¼-in. iron bars will reinforce 500 posts, allowing three bars to the post. These statements were made by A. M. Smith, manager Ohio Post Mould Company, Columbus, O., in a paper read before the American Concrete Institute at its recent meeting in Chicago. He further stated that the average cost of material in an ordinary concrete line post, taking the whole country into consideration, is about $0.15. The cost of labor under the best conditions is said to be less than $0.03, and under the worst conditions could hardly exceed $0.05. While 3/16-in. bars have been found thoroughly reliable in a majority of cases for reinforcing concrete fence posts, Mr. Smith believes that ¼-in. bars should be used in some cases in order to avoid any doubt on this subject. Sizes larger than ¼-in. are uneconomical in his judgment.

CUNARD LINE STEAMSHIP MAKES NEW WORLD'S RECORD.—The *Lusitania* on a recent trip from New York to Liverpool beginning February 17 succeeded in steaming 618 knots between noon of February 19 and noon of the day following. This means an average speed of 26.70 knots and breaks the record of 614 knots for a day's journey held by the *Mauretania* of the same line.

The Economical Operation of Work Trains

The Third Series of Papers Received in This Contest Discussing Methods of Increasing Their Efficiency

KEEPING WORK TRAINS MOVING

By J. W. Foote
Division Engineer, Erie, Salamanca, N. Y.

The purpose of a work train is three-fold: To load or unload material at a low unit cost; to distribute economically material where it is needed for use in the track, and to save time in the performance of said work. Unfortunately, the use of work trains is abused, inasmuch as the unit costs are high in many instances through the neglect of supervising officers determining whether their use will really be economical.

The character of the cars under load is a determining item. Foreign cars costing the receiving company per diem should have prompt unloading and generally a work train will be more economical than way freights or pick-ups. On the other hand, the varying value of system cars sometimes renders the use of a way freight or pick-up in such work the proper method to reduce the unit cost.

As a general thing, the economy in the use of way freights and pick-ups is overestimated. Their use oftentimes results in overtime and foreign and system cars in demand are held for several days before they are released at a rate of one or two a day. For instance, ten cars worth 50 cents each per day are unloaded by a way freight at the rate of two a day. The per diem value of the cars amounts to $15 for this period. If a work train were used and the ten cars were released in one day, this car value would be $5. An added consideration and an important one also is the wages of the laborers employed. By way freights, due to their irregularity of arrival, the laborers usually waste a considerable period of time waiting for service and returning by hand cars or regular trains to their respective headquarters. A gang consisting of twelve men and a foreman, at the rates of 16 and 25 cents per hour respectively, will consume possibly three hours per day for five days unloading the cars and getting to and from the point of work, at a total cost of $32.55. If a work train were used and the ten cars were unloaded in one day, the cost for wages would be $25.54. Comparing the two methods in this instance, in so far as the wages and car values are concerned, the way freight would cost $46.55 against a charge of $30.54 for the work train. If we add the additional cost of overtime which may have been made, we raise the difference in cost still higher. As a general thing, we may conclude that it is not economical to employ revenue trains for work train service, particularly when the car value is high or when it cannot be arranged to reduce the waste time of laborers going to and returning from the point of work.

With work trains in regular service it is important that a competent foreman be placed in charge to avoid a waste of labor. As a rule the supervisor should accompany all trains where possible or at least should keep a proper check on their daily work. The tendency is to overman the trains, whereas if proper supervision was furnished the unit cost could be reduced. The practice of working a given number of men per car, varying according to the character of the work, is a good idea. The men in one car load or unload their material quicker than in another, and there is a race to keep ahead, particularly if the men are allowed to rest after their car is finished.

When improved equipment, such as ditchers, unloaders, spreaders, rail loaders, etc., is used, there is always a chance to cut down the force by a proper study of each problem. The use of portable telephones on work trains where telephone despatching is employed is a great time saver. An efficient conductor, who by the way, is a most important consideration on a train, can keep in touch with opposing trains and thereby reduce the time consumed waiting for trains to pass.

If supervisors and others in charge of work trains will remember that the chief thing is to keep the machine and men working every possible minute, the problem of efficient work train service is nearly solved. A steam shovel, a ditcher or a rail unloader ceases to be efficient when its working hours are reduced by delays foreign to its work.

Facilities should be provided for switching movements, taking water, coaling the work engine, and the other details of a train employed continuously for an extended period. The engine should be equipped with a large tank and in many cases money may be saved by installing a small water tank and pump to provide water for the engines or for the steam shovel when the work is located at a point distant from a water station.

Steam shovels and ditchers should be equipped with forges, and the engineer in each case should be required to make minor repairs and be responsible for the condition of his machine. The foreman in charge of the work should also keep his equipment in first-class condition to reduce to a minimum the minor delays to the work. In spite of the evident wisdom of making repairs, taking water and moving ahead of a steam shovel when trains are switching or unloading, we find the work delayed by this same lack of judgment. The construction of a siding for switching will save possibly twenty minutes per train, when unloading. For ten trains this amounts to three hours and twenty minutes in time, or, in other words, thirteen trains could be unloaded instead of ten at the same cost. If we extend the motto of Colonel Goethals, "Keep the shovels working," to all classes of work trains, we will not need to worry about the unit costs.

IMPORTANCE OF WORK TRAIN ORGANIZATION

By J. E. Bebb
Office Engineer, Duluth, South Shore & Atlantic, Duluth, Minn.

Genius has been defined as 2 per cent. inspiration and 98 per cent. perspiration. Work train efficiency may be said to depend on 75 per cent. preparation and 25 per cent. execution. The first question to be determined, and it is too often wrongly decided, is whether a road train is or is not needed—whether the work may not be more cheaply done in some other way.

Road train work at best involves much indirect expense. In addition to the usual overhead charges not always calculated with accuracy in railway circles, which are nevertheless created in the different departments concerned, and which seldom fall below 30 per cent. of the cost of road train work, there must also be added the lost time of the work train and entire crew due to dodging other trains. There must also be added the cost of delays to other trains by the work train, the excess danger of derailment of a work train and the danger of personal injury, especially to laborers accompanying the train. A total minimum overhead charge, ranging from 45 per cent. on roads having light traffic to 60 per cent. on heavy traffic roads, will be found conservative for road train work.

Thorough preparation for every detail of the work to be done should be made by the person in charge before the train is ordered. Tools should be provided and their good condition assured. Auxiliary equipment should be proved in good condition. The necessary material should be loaded or placed for loading. A tentative schedule should be made, allowing sufficient time at work stations or between stations, compatible with the regular time card. This schedule should be revised by the despatcher before the train is ordered and all concerned should be fully informed concerning the desired train movements. The

necessary cars should be examined and switched to place on the day before the train is ordered. The train and engine crew should be called at a sufficiently early hour to allow all the preliminaries to train movement to be completed before the train's starting time. While the co-operation of the despatcher is of absolute necessity to a day's good work, it must also be remembered that there are other trains on the road, for the safety of which the despatcher is responsible, and that much depends on their regularity. It must likewise be remembered that locomotives have their limits of capacity; that it takes a certain number of men to load or to unload a car of material in a given time; that a locomotive must have water and coal, and that engines suitable for one sort of road train work may be most unsuitable for other road train work.

Train and engine crews experienced and keen to do work train duty are highly desirable. Laborers unused to the particular work in hand, and especially new men not familiar with railway labor, should never be employed on road trains. It is usually possible to initiate green hands into the duties of railway laborers in a less expensive manner. If new men must be used, have experienced and new men work together if possible. Cars should be provided for the accommodation of laborers while the work train is proceeding to and from work, and the men should be obliged to keep their limbs and bodies entirely inside the cars while the train is in motion. No inflammable substances should be allowed in laborers' cars. If a work train is employed for any considerable length of time and boarding trains become the nightly rendezvous, the problem is further complicated by the necessity for temporary telegraph and telephone stations, for supplies, ice, fuel, water and lodgings.

To sum up, organization born of intelligent forethought and the closest supervision, coupled with resourcefulness in emergencies, is necessary to work train efficiency. There are so many unforeseen obstacles to the doing of a day's work in a day that the overlooking of hindrances which should be apparent is inexcusable. But co-operation is the keynote, without which the entire program is in instant and hopeless discord.

HOW THE DESPATCHER CAN HELP A WORK TRAIN

By J. L. Coss

Assistant Chief Despatcher, Chicago, Rock Island & Pacific, Haileyville, Okla.

The most expensive work train is the one that is run for the purpose of repairs, renewals, etc., for the necessary attention is not given to arrange a satisfactory organization. It is necessary to take the first crew out for this train even though they have not had any work train experience. By a little figuring on the part of the chief despatcher arrangements may sometimes be made for a crew having had work train experience. The engine should be equipped with a water car to avoid running for water while on the work between tanks; fire cleaning tools should also be placed on the engine so that if necessary to tie up on the line the engine can have the necessary attention for the next day's work. The running of drags over the working limits should be reduced as much as possible so the work train will have as clear a track as possible. Above all things the despatcher should be fully and clearly notified in advance just what class of work is to be performed and where and cautioned to see that the work train receives careful attention. The average despatcher does not fully realize the importance and expense attached to a work train. The trainmaster and traveling engineer should go with this train and look after its handling by the crew, as a loss of ten minutes to a large gang means money thrown away in more ways than one. When using a work train the work should be carried on in the direction of the current of traffic, if possible, and therefore move with it. At noon, while the track men are eating their lunch, unless the conductor or some member of the crew is an operator, or the telephone is used for despatching, and an instrument is at hand, the engine should go to the nearest office and secure further help on trains and if necessary the crew may get their lunches during this time, so the engine can be back and start to work at 1 p. m. sharp. When the work is finished, the men may be sent home on convenient trains or handled by the work train, the object being to get them home as soon after the work is done as possible. The engine can sometimes be used to handle a train to the terminal or be run to a convenient point to get a train the next day.

THE ECONOMICAL USE OF REGULAR WORK TRAINS

By John S. Thompson

Assistant Supervisor, Philadelphia & Reading, Philadelphia, Pa.

A regular work train is the most economical means of delivering material for repairs or new work, removing material from the scene of repairs, delivering supplies to stations, such as coal, and removing the ashes, removing dirt from cuts, placing dirt on fills where washes have occurred, and delivering mechanics' materials, such as lumber, stone, sand, etc., for repairs to stations, buildings, grade crossings, bridges and culverts, etc.

The economical use of a work train depends largely upon the territory to be covered. The only way in which a work train can be handled properly is to study the existing conditions on the territory to which it is assigned from every possible angle and then arrange its work. One must never stop studying the conditions, for they are constantly changing.

A work train should be equipped with a good engine and cars. The engine desired for good service is one that can make good time with an average train of about eight loaded cars and that can start quickly. The cars should be kept in first class condition and there should be enough of them so that when some are in the shop, the train will not be handicapped. There should be a plentiful supply of good tools of all kinds. These should be kept in regular places so that they could be gotten instantly in case of necessity. It would also be well to have one man assigned to look after the tools, particularly as to their condition. If at all possible, a steam crane car should be a part of the equipment. The time saved in the handling of heavy material will soon pay for the outlay.

Much depends upon the train crew. If possible, the conductor should be a man brought up in the maintenance of way department. Of course, he has to be a transportation department man, but if he has had maintenance of way experience, it is a big advantage. The foreman should be a man who is thoroughly acquainted with all the materials on the territory in addition to being a man capable of planning his work properly, and also being able to make the men work, and do it properly. The subforeman should be capable of taking the foreman's place at a moment's notice. The number of laborers to be employed on a work train can only be determined by the supervising officer who is familiar with all the conditions. While the minimum number should not be less than 20, the maximum should be reckoned according to the working conditions. A train should have as many laborers as are required to do the work properly and expeditiously without having too many, for too many men will only be in each other's way.

The storage yard for surplus and emergency material should be located as centrally as possible, and should be so located that the work train can have easy access to it at all times. Too much valuable time is too often consumed by the work train in getting into and out of the yard. Materials, except in case of rush orders, should be delivered on certain days, to certain parts of the territory, then all concerned can give their orders for these days, in advance.

WORK TRAINS FOR UNLOADING TIES

By W. Krichbaum

Supervisor, Chicago & Erie, Huntington, Ind.

To get the best results from a work train it is always best for the supervisor to accompany it, but if he cannot do so, he should select some good reliable section foreman who is familiar with the territory over which work is to be done, as very few train crews will endeavor to crowd the work along as rapidly

as a man who is directly responsible for same. We aim to unload our ties during the winter so as to be relieved of this work during the good working days in the spring. We start a train of about 20 cars of ties out of the terminal. The supervisor of foreman in charge should have the number of ties noted down that he is to unload between each mile post as nearly as can be determined at the time. He picks up a gang of 21 men, placing 6 men to a car and handling 3 cars at a time. This allows 3 men to work on the ground, 1 man to each small gang unloading the ties from the cars. Those 3 men on the ground clear the track of any ties that drop too close to the cars to give clearance (as we place our ties in pyramid shape piles 40 to 50 to a pile, with the ends toward the track). The train is stopped at a place where the right of way is suitable for piling the ties, and each gang in the cars endeavors to see how many ties it can throw out in the shortest period of time. When 45 to 50 ties are unloaded from the cars the train is moved ahead the required distance, and while moving slowly, the gangs in the cars are getting 15 or 18 ties in the doorway ready for the next stop. If this system is carried out for the day, 20 cars of ties can be unloaded by about 21 or 22 men at a very reasonable price.

The supervisor with the train knows all the level places, so he can instruct the trainmen where to make the next stop each time, causing very little delay. On the road I am with we usually get the "next out" crew which sometimes does not prove to be first class, but a supervisor who is familiar with the work can materially improve the results by knowing just how to handle such a crew. Ballast, rails, and other material should also be handled systematically, employing a smaller or greater number of laborers as the work may require.

No supervisor should ask for a work train until he personally knows he has proper use for it. He should be familiar with all branches of work under his supervision, and if he should have a mixed day's work such as handling a few cars of ties, some ballast, rail, etc., he should outline each piece of work so as to cause no delay to traffic and get the very best results from his efforts as well. When I cannot be with a work train, I always write a lineup of just what is to be done, stating where each car is to be unloaded and the amount of material in other than carload lots. I give this writeup to the foreman in charge with a copy to the conductor so that they can then arrange the work together. It is a very good plan for a supervisor to give the conductor a complete lineup of the day's work the first thing on his arrival so that he can then arrange for meeting trains, getting water and any other delays in order to give the most time possible for actual work.

WORK TRAINS IN THE BRIDGE DEPARTMENT

By E. M. Grime

Supervisor, Northern Pacific, Dilworth, Minn.

The use of work trains in the bridge and building department is confined almost exclusively to the driving of piles or to the handling of heavy bridge girders or concrete slabs. Where much concrete work is in progress it is advisable to have the material ordered well in advance and as fast as it accumulates in sufficient quantity, to order out a work train and a good crew of 20 to 30 laborers with a competent foreman to do the unloading. A work train should not be ordered for this class of service until there is at least work for an entire day in sight and preferably for several days. On those divisions where there is a large amount of bridge work in progress requiring falsework and foundation piling, etc., a work train is necessary practically all the time, for when not engaged with the pile driver it is required with the derrick unloading or placing girders, slabs or other heavy material. Occasionally it may be practicable to dispense with the train for several days or a week at a time and as the expense invariably runs from $40 to $50 per day, this should be done whenever possible.

The efficiency of a work train depends largely on the foreman and especially on the conductor. By keeping in close touch with the train despatcher, taking advantage of every opportunity to get out on the main line between trains and getting any necessary switching done while at the station waiting for orders the wide-awake conductor will gain several hours' working advantage during a day. Such a conductor keeps in close touch with the foreman who is in charge of the work and clearly understands every move that is to be made.

Overtime is usually an objectionable feature of this class of work, but there are frequently times when a few hours overtime put in when conditions are favorable will save going back again and spending probably an entire day on the same work. Attention to all these details is so important that great care should be exercised in picking out those men for work train conductors who have shown special aptitude along these lines. Sundays or holidays may well be utilized for overhauling the equipment and to that end when practicable the work for the latter end of the week should be selected as near to a terminal as possible to avoid loss of time moving the entire crew. It is usually desirable to carry a boarding car outfit with a work train to save the time of the men going back and forth for meals, and also to keep the whole crew together and have it immediately available in case some emergency work comes up, as a wreck or a washout for which a work train outfit is invariably required. Work for a crew engaged in this class of work should be kept lined up at least 30 days ahead so that one job can be made to fit in with another and very little time be lost in traveling. One of the most important features controlling the cost of work trains is the despatching service. A portable telephone with equipment tapping the despatcher's circuit at any point is a valuable adjunct to work train equipment and will frequently permit working 30 minutes to an hour longer than would otherwise be possible and still keep in the clear for all trains.

The foreman who is entrusted with a work train should be a man of considerable experience in this line of work, and one who is able to assert himself and see that he is getting the maximum service out of the crew and the train. As work train expense is large the supervisor should at all times keep in close touch with this part of his work. A daily wire report confirmed by mail should be required indicating the time the crew starts to work, the time it ties up and a fairly accurate description of the work accomplished during the day.

HANDLING TEMPORARY WORK TRAINS

By Vic. W. Bennett

Assistant Superintendent, Southern Pacific of Mexico, Mazatlan, Mex.

In handling temporary work trains on single track, the time in the week should be selected for the work train when the least number of trains will be on the road so as to reduce the loss of time waiting for trains. Everyone should be lined up in advance as to just what will be done. The roadmaster should go over the line and get in touch with the foreman who is to be in charge and impress him with the importance of getting as much work out of the train as possible. If the work is to be cleaning out or widening cuts, all possible pick-work, etc., should be finished before the train arrives. A little overtime to train and engine crews will pay when this will allow the laborers to get in a full day. The responsible officer should be with the train whenever possible, as there are very few ways in which an officer can earn more for the company than by being on the ground with a work train, especially when it is only a temporary job, and there has been no chance to educate the men to a high degree of efficiency. The train and engine crews should be picked if possible, but if not, they can usually be educated on the desirability of getting every possible minute of working time out of the train. If the conductor is a live one there will not be much trouble in getting him interested, and if he is not, he should be laid off as soon as possible in order to get some one else. The train crew should not stay in the caboose and wait until someone goes and tells them to move. At least one man

ought to be outside all the time, and if the brakemen are out flagging, the conductor should be out where he can give a signal to move when wanted.

It is a disadvantage to a work train to start out with a straight form "H" work order. If the despatcher refuses to give anything else, however, the working limits should be made as short as possible, changing them for the afternoon if, by so doing, an advantage can be gained in the distance over which the order is good. A work order ought to include example (3) if possible, and the despatcher can specify what extras to protect against. If there are no extras in sight the conductor can agree to report at a telegraph office at any specified hour if there is no telephonic communication. The despatcher should also give an order to protect against all unimportant regular trains, and time on other regular trains that are late. The despatcher can help greatly if he will, and the train crew should help him by not abusing the privilege he gives them of protecting against trains. There is no reason why the despatcher should tie up a work train the way he can with a straight form "H" work order unless he has several extras in sight both ways. If the despatcher refuses to give a work order as specified above, he may at least run the work train on a straight running order to the nearest side track to the work, so that it is not necessary to start flagging as soon as the train strikes its working limits.

A work train engine should be equipped with headlight and pilot on both ends. This will save time and promote safety. If the work consists of straight loading or unloading of material it can be hauled to or from the nearest side-track by a freight train unless the work train can handle it and make good time. It is not economy to have a work train drag along over the road with heavy tonnage, while laborers are remaining idle.

Since the fixed or overhead charges are practically the same, no matter how many men are employed, it is economy to use as many as can be worked to advantage.

WORK TRAIN SERVICE AT A GRAVEL PIT

By T. Hickey

Roadmaster, Michigan Central, St. Thomas, Ont.

The cars and appliances necessary for proposed work should be switched on some track together, where they can be readily picked up by the work train crew at the time ordered. Cars are liable to get blocked in large yards, causing serious delay both to the train crew and to laborers expected to do the work. I arrange, when necessary, for an auxiliary tank to be attached to the work train engine, to serve as an additional water supply. I find this to be saving in time, that may otherwise mean considerable delay to the work. All work should be done under the direction of an assistant roadmaster or an experienced foreman, understanding fully the work to be done.

The proper handling of the work and work trains depends primarily upon the amount and kind of work to be done, as well as the length of haul of material and other general conditions. I have a gravel pit, two and a half miles from the main track, from which a great deal of material has been taken for the past 12 years, and more particularly during the past four years. The haul on this material was 45 miles over 15 miles of single and 30 miles of double track.

A certain class of engines suitable for the work are requested and also certain enginemen and train conductors who have been tried before in this service. A water plant is provided at the pit sufficient to supply the steam shovel and pit engine, and occasionally one of the road engines, when necessary. A telegraph office is also located in the pit, from which all conductors leaving the pit receive train orders. A car repairer is stationed here to do the necessary oiling of cars and make other light repairs. One engine and crew is stationed in the pit with the steam shovel and two crews are assigned to hauling, each train containing 50 cars. The shovel loads 150 cars each day, or about 2,250 cu. yds There is scarcely any failure in making this daily average, and each hauling crew makes 135 miles a day, or a trip and a half.

The time that the first train leaves the pit each morning, as well as the place of unloading, is well understood, not only by the train crews, but by all others interested in the work, with the result that each crew makes its trips regularly. The pit conductor is in full charge of the work in the pit. He makes a daily inspection of material and supplies on hand and orders additions in sufficient time to prevent the supply becoming entirely exhausted.

ORGANIZATION OF WORK TRAINS

By George E. Lowe

Track Supervisor, Delaware, Lackawanna & Western, Elmira, N. Y.

If there is plenty of work to keep a train busy there are a great many advantages to be secured from a regular work train, as in most cases this means a regular crew, and like nearly all other classes of work, if the men are on the work train steadily they become acquainted with the work and will give much better results than a crew strange to the work who remain on for a day or two and then are exchanged for another crew. This same rule applies to a foreman and gang of men. If there is work enough there should be a regular foreman and gang of laborers, the number of laborers to be determined by the amount and class of work to be done. The number, of course varies, but a good system is to have a fairly good sized gang of from 20 to 25 laborers.

All work trains doing work that requires a regular gang of men should be in charge of a good, competent foreman, supervisor, roadmaster or other official and not be left to the conductor alone, as very few conductors are capable of handling a gang of men and properly looking after their trains at the same time. Where the work can be handled by an occasional work train the problem of keeping it well manned is a difficult one, and a good method is to have a section foreman near the terminal or laying up point of the work train who is capable of handling the work train and who has an assistant foreman to leave in charge of the section in his absence. He can then draw a few laborers from each section gang located in the line of work and which is well along with its section work. This will work out very well where the work train work is light. However, where work train work is heavy but does not warrant a regular work train, a few extra men should be allowed on the sections where work train laborers are to be drawn from.

Very often the work train privilege is abused, as in cases where a work train is run over the division distributing a few crossing planks, a few kegs of spikes and bolts or other material at section houses that are located near a freight station or storage track where way freights stop and do work or even switch carload lots. Lack of a good system in ordering and handling material and supplies also often causes an unnecessary amount of work train work, resulting in heavy work train expenses.

Too often we find a small, inferior and almost worn out engine, a 50 per cent. engine, on a work train, due to the fact that this class of engine is too light for hauling heavy trains over the road and still is too good to be consigned to the scrap heap. This may be profitable if not carried too far, as about one-half the time on the average road a small engine is capable of doing the work equally as well as a larger engine, as when handling a few cars, when unloading rails or other light work, but where ballast, rails and other material are hauled over the entire division in great quantities by work trains, which in some cases is necessary, due to the lack of storage room at the different points, a large 100 per cent. engine should be furnished. No one having the authority to order work trains should be prevented from ordering a large engine, and the motive power department should be authorized to furnish an engine suitable for the work to be performed. All roads have their days when business is slack, and very often we find a 50 per cent. engine on a work train and a 100 per cent. engine lying idle in the roundhouse owing to a slight falling off of business for a few days.

A very bad practice is to have a work train crew make up its

own train in yards or terminals where regular drill engines are required, as this not only delays the work train and gang of men, but also interferes with the drill crews doing their work. Nearly all yards or terminals have their system of doing work, and when road work train crews pick up a few cars here and there it breaks up the system and causes a delay to drill engines over and above the time it would require them to switch out and make up the work train. If work train crews are to switch out and make up their trains they should go on duty a sufficient length of time before the time of the gang of men starts to enable them to do this work and be ready to leave as soon as the men's time begins.

PROPER HANDLING OF WORK TRAINS

By R. B. Abbott

Division Engineer, Philadelphia & Reading, Harrisburg, Pa.

Involving, as the operation of work trains does, an hourly expense of from five to six dollars, a high premium is placed on efficient manipulation of the daily program, and a very careful selection of conductor and foreman should be made. In the opinion of the writer it is better to place the chief responsibility on the conductor, and have the foreman subject to his orders. This plan usually results in a great saving of time as the conductor will have a keener interest in the performance of the train, and will desire to make a good showing. The foreman should have direct charge of the men, and his ranking below the conductor would have very little, if any, depressing effect on his interest in the work. In the temporary absence of the regular conductor the foreman should be given charge of the work, and the extra conductor instructed to handle the train subject to his orders. By this method there will always be in direct charge a man having a special interest in the amount and quality of the work done. Where the chief responsibility is placed on the conductor, it is the writer's opinion that his rate of pay should exceed that of the engineman. Unfortunately, any adjustment along these lines is difficult to secure, as it would mean the establishment of a precedent and meet with strong opposition in certain directions.

The number of men to be assigned to a train varies with the kind of work, the number of labor-saving appliances on the train, and the kind of engine furnished. It is too often the practice to assign to work trains engines that are the lightest and poorest in other respects. Another cause of delay and loss of efficiency is often found in the insufficient capacity of the tenders, making it necessary to run for water two or three times a day, whereas a tender of maximum capacity would perhaps result in no loss of time on this account.

As a rule twenty laborers to the train is about right, but there are times when this number should be increased or decreased, and the need of such adjustment should be recognized and promptly made by utilizing some of the men from section gangs or floating gangs, if available, on the one hand, and by assigning the over-supply to aid the section foreman on the other.

The work required of a train is so varied that it is beyond the scope of this article to take up each phase separately. The supervisors should keep in close daily touch with the situation, and give the conductor in writing an outline of the program. On a separate file should be kept a list of the various items for the attention of the train, and each daily assignment should be grouped so that the work will be continuous and progressive in the direction and within the limits of the day's journey. This program laid out by the supervisor should be in the form of a skeleton schedule elastic enough so that the conductor will be free to vary it to suit the operating handicaps of the day.

The above suggestions refer to regular work trains. Usually the special service work is assignable as a unit for each day, and the planning is a simple matter. As the conductor is usually without much, and often without any, experience in roadway work, the chief command should be vested in the foreman.

The relative economy of work trains for certain classes of work is hard to determine, as so many variables are present in the form of revenue, business and territorial restrictions of many sorts. In the matter of grading alone it frequently happens that the cheapest is not the approved way, as low cost of construction is sometimes sacrificed to save time. This occurs where improvements have been so long deferred that haste is imperative, and becomes the slogan as soon as a job is authorized. Generally speaking, it is an easy matter to decide when an extra train is needed, although the number of laborers to be assigned in each case is subject to considerable adjustment.

SPECIAL AND PERMANENT WORK TRAINS

By J. T. Bowser

Chief Clerk, Maintenance of Way Department, Queen & Crescent, Danville, Ky.

In handling ballast on roads where grades are such that one train cannot handle enough material for a day's work for a work train, it is often practicable to call two trains to handle the material to the points at which it is to be unloaded, then have one train unload all the material, and use the other to handle revenue freight from fill out points. When there is not enough material for a day's work, and it is not advisable to wait until this amount accumulates, a train may be ordered, and after unloading what is on hand may be used on other tonnage if available. It is often possible to take advantage of light power when traffic conditions make it necessary to operate light power in one direction, using such power for unloading company material where the amount of work to be done would not delay the power to such an extent as to prevent it getting to the terminal when needed.

When putting on a regular work train too much emphasis can hardly be placed on the necessity of securing a good conductor. Conductors on such trains should be required to report to the supervisor in every thing except rules governing the safe operation of the train. This will not interfere with the authority of the transportation department officials, and will insure much better service for the maintenance of way department. The conductor should feel that he is a maintenance of way department employee for the time being, and that his interests lie with that department. Conductors and foremen in charge of regular work trains should be furnished each day with written instructions as to the work to be done the following day, and should understand that if the work for any particular day is not finished that day, it should be continued the following day unless instructions are received to the contrary.

In the majority of cases where a regular work train is put on, it is probably best to assign an extra gang to it. This gang should be provided with camp cars containing accommodations not only for the gang, but for the train and engine crew as well. This will enable them to be moved from point to point readily, as the work may require.

The size of the gang to be used on work trains depends largely on the class of work to be done. A comparatively small gang may be used for ballasting, distributing ties, etc., while, as a rule, only a large gang is economical in ditching. In some classes of work, such as ditching, it is often possible to take advantage of time which must be spent in the side track meeting other trains. There may be ditching to be done on the side track, and there is always some work at which the men may be put.

In all cases the foreman in charge of a work train should be required to make a daily report of the work done, and the delays sustained. The delay report should be itemized, showing the amount of delay for each train and from other causes. Any delay meeting trains of an apparently unnecessary length should be reported to the chief despatcher, as conditions causing delays may often be remedied if called to the attention of the proper authority.

ABSTRACT OF ENGINEERING ARTICLES

The following articles of special interest to engineers and maintenance of way men, and to which readers of this section may wish to refer, have appeared in the *Railway Age Gazette* since March 13, 1914:

Rebuilding 275 Miles of Milwaukee's Line in Iowa.—The general conditions which made advisable the expenditure of over $18,000,000 for double tracking, reducing grades, and improving the alinement on the Chicago, Milwaukee & St. Paul's main line across Iowa and some details of the methods used in handling the 15¾ million cu- yd. of grading material were described and illustrated in the issue of March 20, page 683.

The American Steel Rail Situation.—An abstract of a paper by Robert W. Hunt, presenting a summarized statement of the mechanical practice of the steel rail mills of the United States and Canada and emphasizing again the importance of physical treatment of the metal in addition to its chemical composition, was published in the issue of March 27, page 739.

New Norfolk & Western Coal Pier at Norfolk, Va.—The Norfolk & Western has recently completed and put in operation, at its seaboard terminal at Lambert's Point, near Norfolk, Va., the largest coal handling pier on the Atlantic coast. The record that has already been established with one-half of the plant in operation, shows that at the same rate the pier can handle nearly 100 tons of coal per minute. The unusual features of this new design which combines a gravity pier and mechanical dumper were described in the issue of March 27, page 749.

An editorial discussing the development that has been made recently in coal loading docks was published in the same issue on page 726.

The Railways of the Argentine Republic.—Two articles by F. Lavis describing the railway system of the Argentine Republic which include much information as to the standards of construction and the methods of maintenance used on these lines, were published on pages 731 and 773, in the issues of March 27 and April 3, respectively.

Pennsylvania's Improvements at North Philadelphia.—The extensive improvement which the Pennsylvania is making to its passenger facilities at the North Philadelphia station, including the construction of a steel girder bridge over Broad street with unusual concrete ornamentation, was described and illustrated in the issue of April 3, page 789.

Notes on the Design of L. C. L. Freight Houses.—An abstract of a paper by E. H. Lee, vice-president and chief engineer of the Chicago & Western Indiana, giving a comparative study of the various types of freight houses from the standpoint of economy in fixed charges and operation, was published in the issue of April 3, page 785. An editorial discussing this study was published in the same issue, page 769.

Superelevation on Curves.—A letter to the editor, by E. R. Lewis, assistant to the general manager, Duluth, South Shore & Atlantic, calling attention to the importance of determining by actual test, the train resistance on curves as a basis for determining the proper superelevation, was published in the issue of April 10, page 818.

The Construction of the Northwestern Pacific.—The general features of grading and bridge work on a 103-mile line built through an almost inaccessible country in northern California, were described and illustrated in the issue of April 10, page 831.

AMERICAN WOOD PRESERVERS' COMMITTEE APPOINTMENTS

Following the practice inaugurated one year ago of appointing standing committees to consider various problems of interest to the association, the executive committee of the American Wood Preservers' Association has announced the following committees for this year with the subjects for their consideration.

PRESERVATIVES

1. Co-operate with the other national associations in the adoption of uniform specifications for three grades of creosote suitable for the treatment of ties, the treatment of paving blocks and the treatment of timber subject to attack by teredo.

2. Prepare specifications for zinc chloride and creosote, revising the specifications adopted by the association several years ago.

3. Compile a complete list of all creosote specifications.

Committee: Ernest Bateman, chairman, United States Forest Products Laboratory, Madison, Wis.; S. R. Church, Barrett Manufacturing Company, New York; W. H. Fulweiler, United Gas & Improvement Company, Philadelphia; L. C. Drefahl, The Grasselli Chemical Company, Cleveland; E. B. Fulks, American Creosoting Company, Louisville, Ky.; C. M. Taylor, Philadelphia & Reading, Port Reading, N. J., and A. L. Kammerer, consulting engineer, St. Louis.

SPECIFICATIONS FOR THE PURCHASE AND PRESERVATION OF TREATABLE TIMBER

1. Review the best known methods of preservation of timber, ties and piling, and the kinds of timbers best adapted to these different methods of preservation, specifying the qualities, characteristics and conditions which these timbers must possess to meet the requirements of well preserved timber, ties and piling.

2. Outline the fundamental principles which underly any method of preservation to secure the greatest benefit.

Committee: E. A. Sterling, chairman, consulting forester, Philadelphia; Carl G. Crawford, American Creosoting Company, Louisville; Lowry Smith, Northern Pacific, Brainerd, Minn.; C. P. Winslow, Forest Products Laboratory, Madison, Wis.; Herman von Schrenk, consulting timber engineer, St. Louis, Mo.; W. A. Fisher, Atlantic Coast Line, Gainesville, Fla.; O. C. Steinmayer, St. L. & S. F., Springfield, Mo.

WOOD BLOCK PAVING

1. Prepare a comprehensive history of wood block paving.

Committee: Walter Buehler, chairman, Creosoted Wood Block Paving Association, Minneapolis; F. P. Hamilton; H. S. Loud, United States Wood Preserving Company, New York; H. G. Davis, Chicago Creosoting Company, Chicago; W. C. Meredith.

PLANT OPERATION

1. Prepare a list of principles of standard practice for plant operation.

Committee: H. M. Rollins, chairman, Gulfport Creosoting Company, Gulfport, Miss.; F. H. Stewart, Central of Georgia, Crumps Park, Ga.; A. M. Smith, Ayer & Lord Tie Company, Argenta, Ark.; C. D. Batson, Republic Creosoting Company, Mobile, Ala.; A. C. Pace.

MISCELLANEOUS SUBJECTS

1. Investigate the seasoning of red oak ties and the separation of ties for treatment.

Committee: J. H. Waterman, chairman, C. B. & Q., Galesburg, Ill.; W. F. Goltra, The W. F. Goltra Tie Company, Cleveland; S. B. Lindley, Western Wood Preserving Company, Spokane, Wash.; M. K. Trumbull, National Lumber & Creosoting Company, Texarkana, Tex.; A. G. McIntyre.

ECONOMY DURING RETRENCHMENT

The following notice issued by a supervisor on the Pennsylvania Lines to his foreman urging economy during the present period of retrenchment contains several points which other supervisors can well afford to emphasize upon their employees.

"In accordance with the retrenchment policy now in vogue on all railroads, each employee should endeavor to be as economical with labor and material as possible. In a number of instances old or once used material can be used instead of new material and will make just as good repairs as new material. No cross ties, switch timber, rail, etc., should be removed from the track which will last over to another season, with due regard to the safety of the tracks, thereby making a great reduction in the cost of material for maintenance.

"Unless proper care is used in the use of track spikes, bolts, nutlocks and other similar small articles many will be lost. All material left over after completing a piece of work should be carefully gathered up and taken care of. Each foreman should make a frequent personal inspection of all tools and equipment and endeavor to keep them in the best condition possible, as even the best workman cannot do efficient and economical work with inferior tools. All tools should be put under shelter when not in use, as inclement weather does not contribute to the best condition of tools. Each employee should bear in mind that we are all working for the best interests of our employers.

"While 'Safety First' should always be our motto, a due regard for the safety of the financial condition of our employer should be considered, as it only requires small leaks in various places to turn the balance sheet from profit to loss. In the use of material and labor you should always consider that 'a penny saved is a penny earned,' and that if each employee shall make so small a saving as *five cents* per day, the total saving for our company will be enormous. In the employment of men you should always endeavor to secure the most efficient and intelligent men possible. Employees who do not measure up to this standard should be eliminated from the service, as one inefficient and incompetent employee in a gang will influence the entire organization of that gang, and will extend his detrimental influence to other gangs as well."

Korean Railway Development.—The Taiden-Mokpho Railway, 174 miles in length, was formerly opened on March 23

Extensive Great Northern Snow Shed Construction

Over 14,500 Ft. of Timber and Combination Concrete and Timber Protection Built in Cascade Mountains

During the summer of 1913, the Great Northern built 14,594 lineal feet of timber and combination concrete and timber snow sheds on its main line between Scenic and Tye, Washington, on the west slope of the Cascade mountains, at an expenditure of $1,500,000. This record is unusual, not only in the amount of snow sheds built in the short distance of nine miles, where approximately 14,000 ft. of snow sheds were already in service, but more particularly because of the amount of work of this nature completed in one short season. In this latter regard, a record was made which has seldom, if ever, been equaled in similar construction. Twenty-five million feet, B. M., of timber and 55,000 cu. yd. of concrete were placed in six months; in addition a double track tunnel 1,200 ft. long was driven at a point where it accomplished a double purpose of bettering the alinement and affording protection from snow trouble. Besides this new work, very extensive repairs and improvements were made in existing timber sheds within these same limits.

LOCAL CONDITIONS

In common with other western roads, the Great Northern has always encountered trouble with snow on the western slope of the Cascade mountains, where the snow fall is unusually heavy, and where climatic conditions are conducive to snow slides. The winter of 1912-1913 was one of unusual snow fall, and the resulting interruption of traffic was unusually severe. As a result of this experience, the extensive construction of snow sheds outlined above was decided upon, to insure against further trouble.

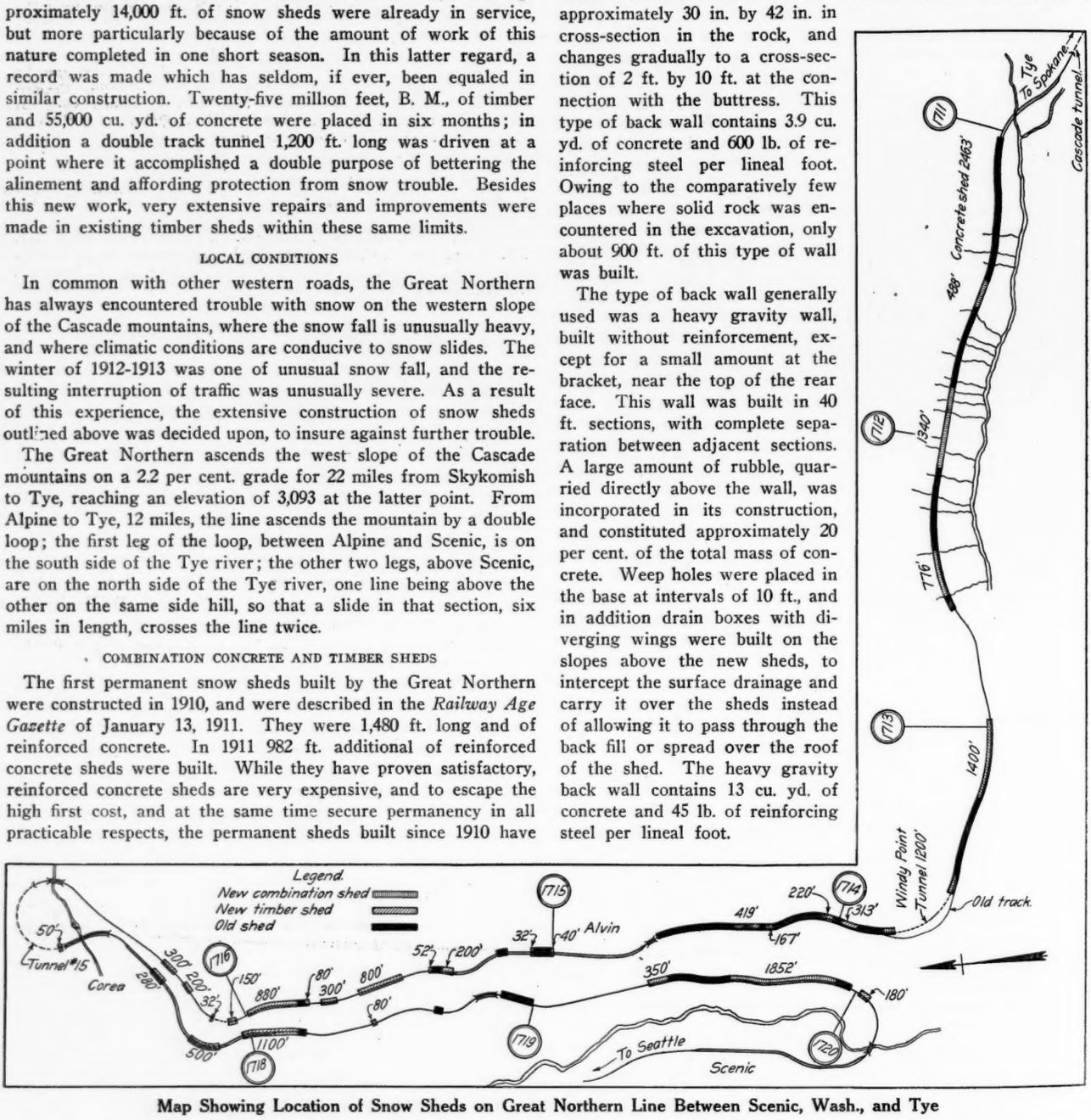
The Great Northern ascends the west slope of the Cascade mountains on a 2.2 per cent. grade for 22 miles from Skykomish to Tye, reaching an elevation of 3,093 at the latter point. From Alpine to Tye, 12 miles, the line ascends the mountain by a double loop; the first leg of the loop, between Alpine and Scenic, is on the south side of the Tye river; the other two legs, above Scenic, are on the north side of the Tye river, one line being above the other on the same side hill, so that a slide in that section, six miles in length, crosses the line twice.

COMBINATION CONCRETE AND TIMBER SHEDS

The first permanent snow sheds built by the Great Northern were constructed in 1910, and were described in the *Railway Age Gazette* of January 13, 1911. They were 1,480 ft. long and of reinforced concrete. In 1911 982 ft. additional of reinforced concrete sheds were built. While they have proven satisfactory, reinforced concrete sheds are very expensive, and to escape the high first cost, and at the same time secure permanency in all practicable respects, the permanent sheds built since 1910 have been combination concrete and timber structures, the back wall and foundations being of concrete, with timber posts and roof.

Four thousand five hundred lineal feet of combination concrete and timber sheds were built in 1913. Two types of back wall were used. Where the slope of the excavation was steep, and consisted of solid rock, a thin reinforced concrete wall was built and anchored into the rock. This back wall is 12 in. thick at the top, and 34 ft. 3 in. high above base of rail, with the front of the wall plumb and the back face battered ¼ in. per foot. It is reinforced with buttresses 2 ft. thick, spaced at intervals of 10 ft. At each buttress an anchor of concrete, heavily reinforced, extends 8 ft. into recesses blasted in solid rock. This anchor is approximately 30 in. by 42 in. in cross-section in the rock, and changes gradually to a cross-section of 2 ft. by 10 ft. at the connection with the buttress. This type of back wall contains 3.9 cu. yd. of concrete and 600 lb. of reinforcing steel per lineal foot. Owing to the comparatively few places where solid rock was encountered in the excavation, only about 900 ft. of this type of wall was built.

The type of back wall generally used was a heavy gravity wall, built without reinforcement, except for a small amount at the bracket, near the top of the rear face. This wall was built in 40 ft. sections, with complete separation between adjacent sections. A large amount of rubble, quarried directly above the wall, was incorporated in its construction, and constituted approximately 20 per cent. of the total mass of concrete. Weep holes were placed in the base at intervals of 10 ft., and in addition drain boxes with diverging wings were built on the slopes above the new sheds, to intercept the surface drainage and carry it over the sheds instead of allowing it to pass through the back fill or spread over the roof of the shed. The heavy gravity back wall contains 13 cu. yd. of concrete and 45 lb. of reinforcing steel per lineal foot.



Map Showing Location of Snow Sheds on Great Northern Line Between Scenic, Wash., and Tye

With the exception of the back walls, the two types of combination concrete and timber sheds are alike. They are built for double track. The posts are supported on concrete pedestals, and carry a roof of 12 in. by 12 in. timbers, laid on a slope of 1 in 5. The sheds are designed for a dead load of 900 lb. per sq. ft., in addition to 100 lb. per sq. ft. of slide action. Although

but little trouble is encountered by drifting snow in this vicinity, it piles up against the lower edge of the shed and on top, and tends to crowd into the shed from the lower side wherever the slope is relatively flat, or where there is a wide fill or "daylighted" cut on the lower side. To protect against this trouble, the outside of all the sheds is covered with 3 in. by 12 in. planks with 3 in. spaces between them. Provision is made for removing these planks in summer. These sheds require about 700 ft., B. M., of timber and 107 lb. of hardware per lineal foot of shed.

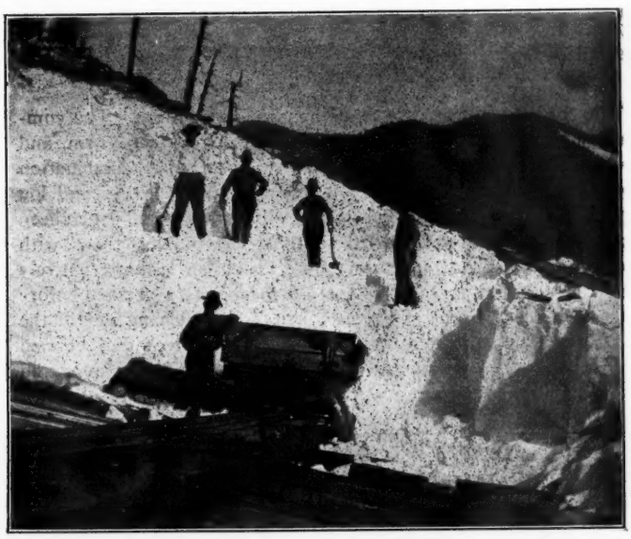
TIMBER SHEDS

The amount of additional snow shed protection that it was desirable to build in 1913 was so great that it would have been

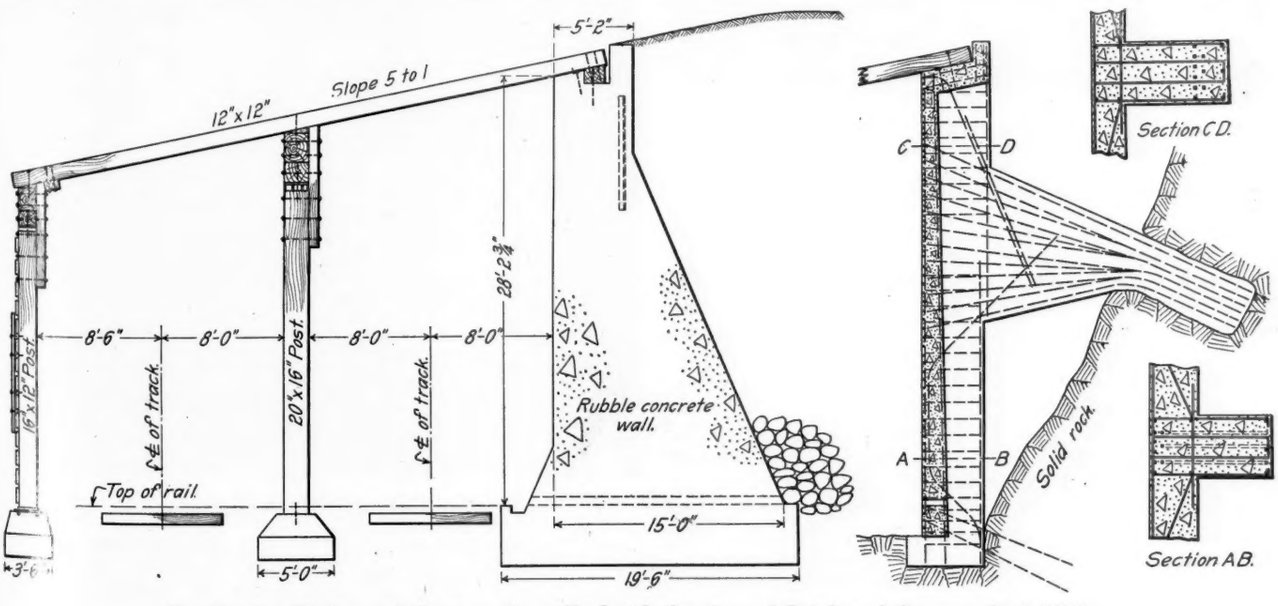
View of Loop at Scenic, Taken from Alvin

impossible to build all of the new sheds of the concrete and timber types above described. This was especially true because wherever a concrete back wall has been built it has been located in reference to a double track line, and in many places to so locate the concrete back wall would require a large amount of excavation, while in other cases slight changes will be made in the line when double tracking is done, so the 4,500 ft. of combination concrete and timber sheds described was considered all that should be undertaken in one season, and it was all constructed for double track, on permanent alinement. The remaining 10,094 ft. of new shed was therefore built of timber.

The accompanying plans of the timber sheds indicate variations used to suit the different slopes, and different materials encountered. Where the side of the excavation was solid material or where the slope was flat enough, vertical posts were placed directly upon sills. In many places the material was too loose or the slope too steep to permit this kind of construction, and cribs were built up to conform to the slope of the bank. On steep slopes, where slides pass entirely over the shed, but do not lodge either on or against the lower side, the timber bents were spaced 8 ft. centers, and the sheds are designed for a load of 500 lb. per sq. ft. Wherever heavy slides are possible, or where the snow might lodge on the roof or against the outside, the bents were spaced 4 ft. between centers, and were designed for a load of 900 lb. per sq. ft. The sheds are all designed with a brace on the outside of each bent to resist the thrust caused by the slide action on the roof. Wherever snow might lodge



Removing Snow from Top of Old Timber Shed to be Wrecked One Mile East of Scenic on May 6

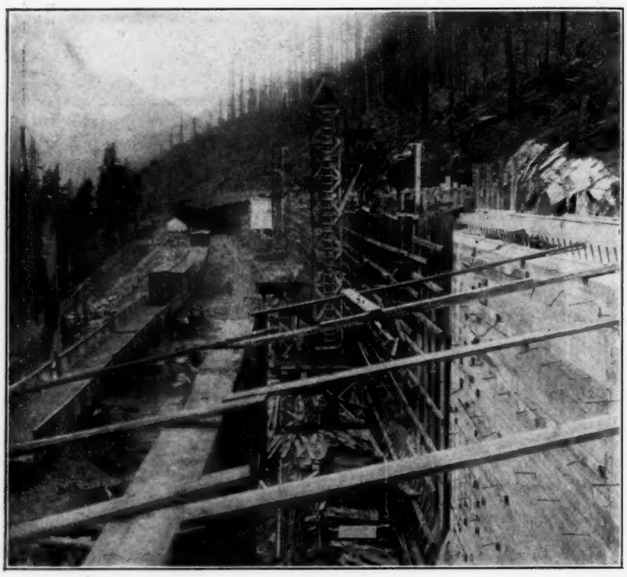


Combination Timber and Concrete Snow Shed with Gravity and Reinforced Concrete Back Walls

against the outside of the shed, an additional 10 ft. in width was built on the lower side, the roof of the shed being extended out over it, and its outer side being boarded with 3 in. planks from the roof down about half way on the posts, while the outside of the next row of posts (the outside posts of the regular type of shed) are similarly boarded up with 3 in. planks from the bottom to the same level. By this method, the pressure of the slide against the outside will be exerted against two rows of posts, instead of one.

CONSTRUCTION METHODS

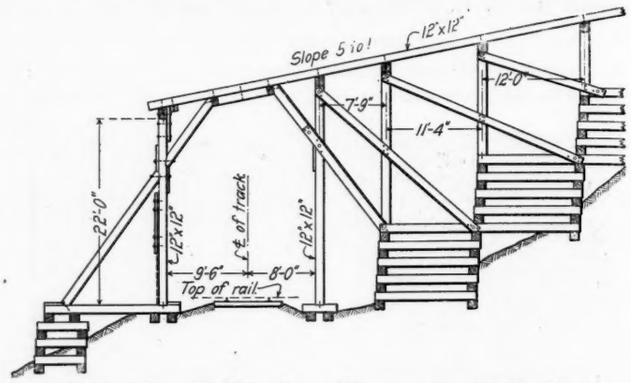
The construction work was all handled by contract. The combination concrete and timber sheds were built by one firm, and the timber sheds by another. Of the 4,500 ft. of combination concrete and timber sheds, 1,800 ft. replaced old timber and log crib sheds, while 2,700 ft. was built where there had never been any sheds before. The replacement of the old log sheds with concrete was considerably more of a task than building entirely new sheds, as the removal of the old sheds was necessary before work could be started on the new ones. The tearing out of the old sheds was further complicated by the fact that they carried a great depth of snow, and before they could be removed the snow had to be disposed of. This work was started early in



Constructing Concrete Back Wall of Combination Sheds

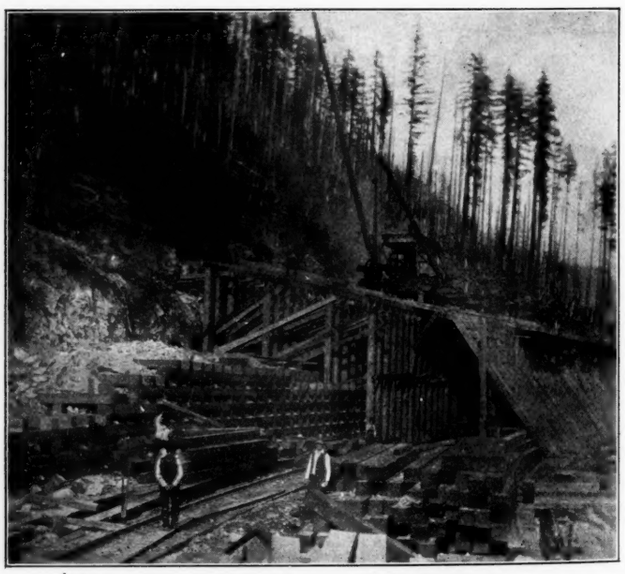
May, and in all 300,000 cu. yd. of snow were removed from the sheds. It was packed very hard, and much of it had to be blasted before it could be handled. Various methods of moving it were used, including a derrick, small cars loaded by hand, and hydraulicking. Some idea of the shortness of the season for carrying on so large a project may be had from the fact that two feet of snow fell as late as May 20, and snow was encountered in the work as late as July 15, while it was impracticable to plan on favorable construction weather in the fall much later than October 15.

Enough snow had been removed so that work was started on tearing out the old sheds on May 27. Enough of these were removed so that excavation for the new sheds was started on June 16, while sufficient excavation was done so that concrete work on these sheds was commenced on July 15. The three classes of work—tearing out old sheds, excavating for new ones, and placing concrete—were carried on simultaneously after that date. As soon as the excavation was far enough along to permit, additional concrete mixers were put on the work. The mixers were set on movable platforms along the front of the back wall, and were moved for every 160 ft. of wall. After being mixed, the concrete was hoisted in skips by means of a high tower, and was discharged into the forms through chutes. Six one-half yard mixers were used in this way at one time, and handled as much as 1,000 cu. yd. per twelve-hour day, notwithstanding considerable delay which was always encountered by reason of the work being done alongside the main line, which was handling a heavy traffic besides work trains. Indeed, as soon as the excavation was far enough advanced to permit the rapid placing of concrete, the controlling feature in the progress of that work was the handling of gravel, sand and cement by the work trains.



Timber Snow Shed for Steep Slopes on Loose Material

Owing to the line being located on a steep mountain-side, there was practically no storage room for materials, so it was necessary to unload concrete material directly from the cars into the mixers. Work trains were furnished and operated by the railroad company, and a trainmaster was placed upon the work in direct charge of operation. The conditions necessitated a sufficient number, and as many as five work trains were employed at one time, handling material for both permanent and temporary sheds, and for the tunnel. Because of the steep grade, cars were not allowed to remain standing on the main line, and the engine was at all times kept on the down-hill side of the cars. With 15 carloads of cement stored at Tye and 13 at Scenic, cement was

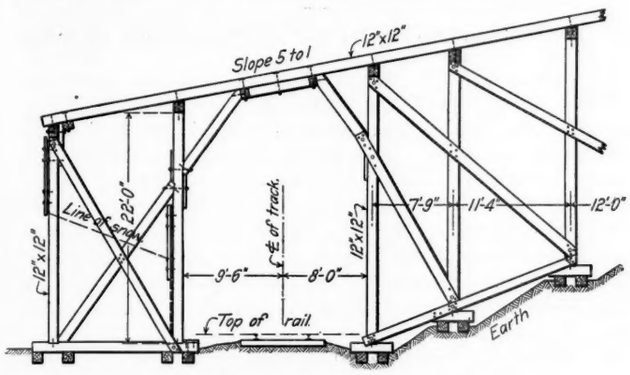


Typical Construction of Timber Sheds

shipped direct from the mill to the work. An average of 7 cars of cement and 40 cars of sand and gravel was required on the work daily.

In constructing the timber sheds all material above grade was placed with stiff leg derricks, located on the roof of the completed shed. Of the 10,000 ft. of timber shed built in 1913, 2,000 ft. was built to replace old timber and log crib sheds, while 8,000 ft. was of new construction, where there had never been any

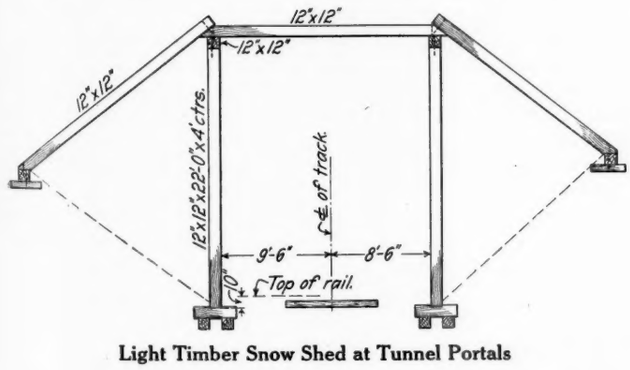
snow sheds before. While in a degree, the removal of the old timber sheds delayed and complicated the construction of the new timber sheds to replace them, as with the new combination concrete and timber sheds, the construction plant on the timber shed work was much more flexible, and could more readily be increased than that used on the combination shed work. At the height of the season 15 erecting crews were at work, each crew using one derrick; the average work of each crew while working was the erection of approximately 20,000 ft. B. M. of timber. The best day's work with one derrick in one twelve-hour shift was 56,000 ft. B. M., while the best total performance in a single day of one twelve-hour shift was 240,000 ft. B. M.



Timber Snow Sheds for Flat Slopes or Solid Supports

Before the work was started it was estimated that plant and camp provisions should be made for a force that could place 180,000 ft. B. M. daily. The work was carried on very nearly at this rate, at one time exceeding 190,000 ft. B. M. per day.

Timbers for standard sections were framed at Gold Bar, 44 miles west of Tye, but all others were framed on the ground. Boring was generally done by air with power furnished by small compressors mounted on small cars, which were set off the track, and which had a radius of operation of 300 ft. Those timbers above the track were fully bolted in position as they were placed; all others were lightly drift-bolted, and then bored in position by compressed air, and permanently bolted. Although there have been no losses by fires up to this time, a 6 in. wood stave

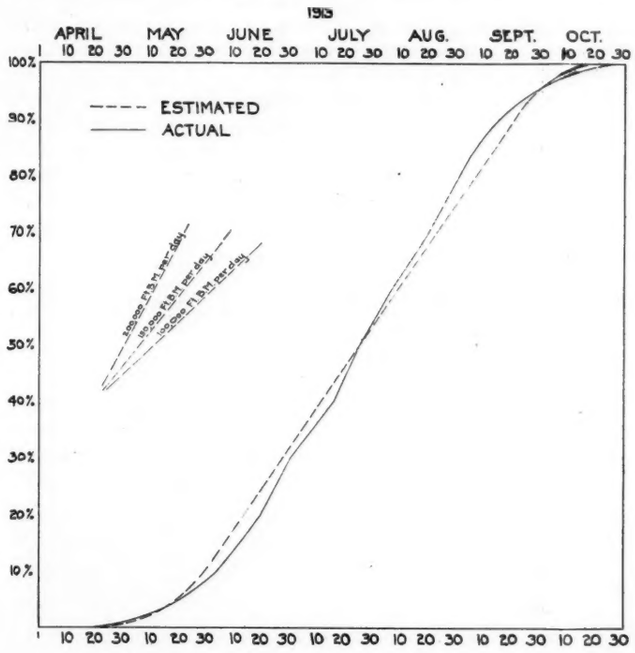


Light Timber Snow Shed at Tunnel Portals

gravity water line was built with stand pipes provided with 2½ in. hose connections every 200 ft. The congested condition of the line and the lack of storage space, of course, affected the timber sheds much as it did the combination concrete and timber sheds, and required frequent train service. After accumulating a reserve stock of 7,000,000 ft. B. M. of timber at a temporary storage yard at Gold Bar, the timber was shipped direct from the mills to the work and unloaded on the site. An average of 10 cars of lumber was required daily on the work.

WINDY POINT TUNNEL

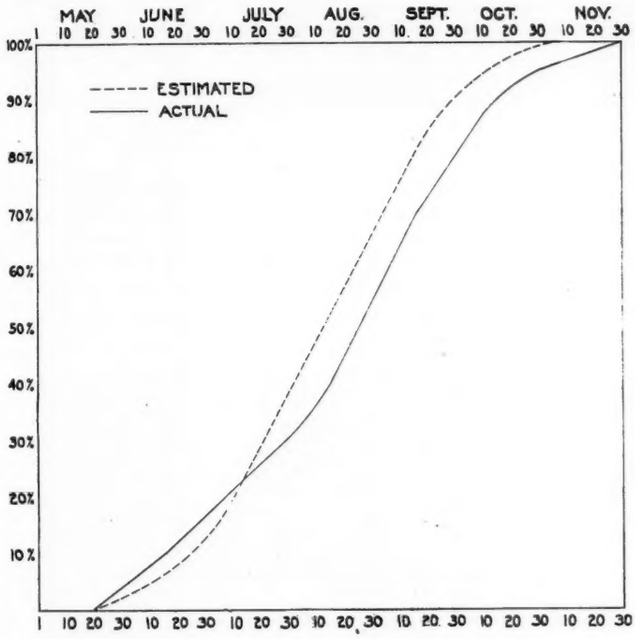
At the east end of the loop opposite Scenic, the line turns through an angle of 90 deg., past a high bluff, known locally as "Windy Point." To avoid the construction of sheds at this place, and also to improve the alinement somewhat, a double track tunnel, 1,200 ft. long, was constructed to replace the old line around the point. The material in this tunnel was badly broken and required timbering throughout the entire length. Being on



Curve Showing Progress on Timber Sheds

a 5 deg. curve, and built for double track, the tunnel had to be taken out very wide.

An 8 ft. by 10 ft. wall plate drift was driven on each side at the west end. Two adits were also opened in from the side of the bluff and wall plate drifts driven in each direction, so that the



Progress on Construction of Combination Shed

two drifts were driven at five different points, and ten faces in all were worked. The materials from these adits was dumped through chutes passing under the adjacent main track and wasted down the mountain side. Following these wall plate drifts

sufficient material was removed to insert timbering for the complete arch, after which the bench was removed by a steam shovel, operated with compressed air, working from the west end. No attempt was made to drive a heading from the east end as the large yardage in the east approach cut required all of the available time. This cut contained 100,000 cu. yd. of solid rock, which had to be excavated from a very high slope alongside the main line, making progress comparatively slow. Upon its completion this tunnel will be lined with concrete.

The combination concrete and timber snow sheds described above, were built by Guthrie, McDougall & Co., of Portland, Ore.; while the timber sheds and Windy Point tunnel were built by Grant Smith & Co., of Spokane, Wash. The work was handled under the direction of Ralph Budd, chief engineer, and O. S. Bowen, resident engineer. K. K. Kuney was assistant engineer, in actual charge on the ground.

WINTER RAILROADING UNDER DIFFICULTIES

As a result of the unusually heavy snow storm in the vicinity of New York on March 1-2, traffic was demoralized on nearly all the roads in that vicinity for one or more days. In common with other roads, the Ulster & Delaware Railroad suffered severely and was completely tied up for a period of two days, especially in the vicinity of Stony Clove Notch in the Catskill

Shoveling Out a Cut

Mountains. At this point, the line passes through a gorge or canyon so narrow that there is barely room for the railroad tracks and a public highway. At this point the line is built on a three per cent. grade and reaches an elevation of 2,173 ft. Although three pusher engines were attached to the snow plow in opening this cut they stuck at five different times and each time had to be shoveled out. Also, after the line was once opened, it was necessary to keep the plows running back and forth for some time to keep the tracks open.

Snow Plow and Three Engines Stuck in a Cut

In adjacent automatic signal territory, the signals were put entirely out of commission. Although the pole line carrying the signal and telegraph wires was built entirely new last season, it was badly wrecked. About 50 per cent. of the signal arms were so matted with wet snow that they froze fast in the clear position before the line wires came down and remained in that position until signal men could arrive on the scene to chop them loose with axes. Because of the great demand for linemen, the repairs to the telegraph wires and signals were not completed until the end of the month.

AN UNUSUAL METHOD OF COLLECTING SCRAP

On January 5 to 28, inclusive, a scrap collecting train was operated over the St. Louis division on the Illinois Central in charge of the division superintendent and his entire staff, including the roadmaster, supervisors of bridges and buildings, signals, water service, etc.; trainmasters, storekeeper, master mechanic, traveling engineers, agents of the important stations, etc., making in all a party of about 50 men. The train consisted of a caboose, coach, dining car from the division wrecking outfit, and the necessary cars for the collection of the scrap material. This train moved over all the branch and main lines of the division.

In addition to the collection of scrap the entire party was organized so that each officer made a close inspection of all work under his supervision at each station. The superintendent, accompanied by the roadmaster, signal foreman and track supervisor, examined every switch and made notes of any repairs found necessary. The supervisor of bridges and buildings, with the painter foreman, inspected all buildings, stock pens, water tanks, etc., looking especially after the fire protection. The division claim clerk checked the expense bills against the freight in the freight house to determine if the agent was properly handling his accounts. The agents from the larger stations who accompanied the party checked over the passenger tariffs with the local agents at the smaller stations, and instructed them in their duties. In this way a very thorough inspection of the entire division was secured. While on this trip the quarterly staff meeting of the division officers was also held, and the men had an opportunity to examine the conditions under consideration as they went over the division.

The amount of scrap and obsolete material gathered on this train amounted to 147 car loads. The storekeeper gave credit for new material to the extent of $581.48; second-hand material, $7,917.76; scrap material, $25,245.81, or a total of $40,745.50. The cost for labor, train expense and meals on this trip amounted to $2,203.81, leaving a net gain of $38,541.69. In addition surplus tools valued at $2,800 were transferred from sections where they were not needed to other sections. As an illustration of the conditions encountered, 12 bottles of ink were found at one small station, where one bottle was sufficient for nearly a year. At another point 50 non-insulated bridle rods were found at a station on insulated territory which were useless there, but serviceable elsewhere.

Entirely aside from the savings in scrap recovered, this trip was considered a success because of the opportunity it offered for the officers of each department to come in contact with the employees of that department over the entire division. It also provided an opportunity for the entire staff to discuss problems of common interest on the ground from place to place. This plan will probably be adopted on other divisions of the Illinois Central in the near future.

ICELAND TO HAVE A RAILROAD.—Hitherto the people of Iceland have had to use their excellent ponies as their means of transport. Soon, however, there will be a railway line under way between Reykjavik and the Rangarvalla district, the length being about 60 miles.

The A. R. E. A. Committee Assignments for 1914

A Complete List of Names of Members Appointed and Subjects Specified for Investigation and Reports

The Board of Direction of the American Railway Engineering Association has selected the personnel of new committees and the subjects for investigation and report during the coming year as follows:

Committee I—Roadway

1. Continue the study of unit pressures allowable on roadbed of different materials, conferring with the committee on Ballast and with the special committee on Stresses in Track.
2. Submit specifications for the protection of slopes by sodding or otherwise.
3. Recommend means for the prevention or cure, as the case may be, of water pockets in roadbed.

W. M. Dawley (chairman), Erie; J. A. Spielmann, B. & O.; J. R. W. Ambrose, Toronto Terminals Company; A. F. Blaess, I. C.; M. J. Corrigan, B. & O.; Ward Crosby, C. C. & O.; W. C. Curd, M. P.; Paul Didier, B. & O.; R. C. Falconer, Erie; S. B. Fisher, M. K. & T.; Frank Merritt, G. C. & S. F.; L. G. Morphy, B. & A.; F. M. Patterson, C. B. & Q.; W. D. Pence, Interstate Commerce Commission; L. M. Perkins, N. P.; W. H. Petersen, C. R. I. & P.; A. C. Prime, P. R. R.; H. J. Slifer, cons. engr.; J. E. Willoughby, A. C. L.; W. P. Wiltsee, N. & W.

Committee II—Ballast

1. Continue investigation of the proper depth of ballast of various kinds to insure uniform distribution of loads on the roadway, conferring with other committees.
2. Continue the study of the subject of ballast sections, with particular reference to the use of a sub- and top-ballast.

H. E. Hale (chairman), Railroad Presidents' Committee on Valuation; J. M. Meade, A. T. & S. F.; L. W. Baldwin, I. C.; D. P. Beach, P. L. W.; W. J. Bergen, N. Y. C. & St. L.; T. C. Burpee, Intercolonial; O. H. Crittenden, I. & G. N.; J. M. Egan, I. C.; T. W. Fatherson, C. R. I. & P.; H. L. Gordon, B. & O.; G. H. Harris, M. C.; C. C. Hill, M. C.; S. A. Jordan, B. & O.; William McNab, G. T.; S. B. Rice, R. F. & P.; E. V. Smith, B. & O.; D. L. Sommerville, N. Y. C. & H. R.; F. J. Stimson, G. R. & I.; D. W. Thrower, I. C.; R. C. White, M. P.

Committee III—Ties

1. Continue the study of the effect of the design of tie-plates and track spikes on the durability of cross-ties.
2. Continue the study of economy in track labor and material effected through the use of treated compared with untreated cross-ties.
3. Continue study of metal, composite and concrete cross-ties, building up a history of same.
4. Investigate and report on the future timber supply for ties.
5. Report on the distribution and care of cross-ties.

L. A. Downs (chairman), I. C.; G. W. Merrell, N. & W.; C. C. Albright, Purdue University; W. J. Burton, M. P.; W. A. Clark, D. & I. R.; S. B. Clement, T. & N. O.; E. D. Jackson, B. & O.; E. P. Laird, A. C. L.; F. R. Layng, B. & L. E.; E. R. Lewis, D. S. S. & A.; J. B. Myers, B. & O.; J. V. Neubert, N. Y. C. & H. R.; R. J. Parker, A. T. & S. F.; J. G. Shillinger, Rutland; I. O. Walker, N. C. & St. L.; H. S. Wilgus, P. S. & N.; Louis Yager, N. P.; E. C. Young, N. Y. P. & N.

Committee IV—Rail

1. Recommend standard rail sections.
2. Continue investigations of rail failures and deduce conclusions therefrom.
3. Continue special investigation of rails.
4. Present specifications for material in rail joints.

J. A. Atwood (chairman), P. & L. E.; W. C. Cushing, P. L.; E. B. Ashby, L. V.; A. S. Baldwin, I. C.; Chas. S. Churchill, N. & W.; J. B. Berry, C. R. I. & P.; G. M. Davidson, C. & N. W.; F. A. Delano, C. I. & L.; P. H. Dudley, N. Y. C.; C. F. W. Felt, A. T. & S. F.; L. C. Fritch, C. N.; A. W. Gibbs, P. R. R.; A. H. Hogeland, G. N.; C. W. Huntington, M. & St. L.; John D. Isaacs, S. P.; Thos. H. Johnson, P. L. W.; Howard G. Kelley, G. T.; C. F. Loweth, C. M. & St. P.; H. B. MacFarland, A. T. & S. F.; R. Montfort, L. & N.; C. A. Morse, C. R. I. & P.; J. R. Onderdonk, B. & O.; J. P. Snow, cons. engr.; F. S. Stevens, P. & R.; A. W. Thompson, B. & O.; R. Trimble, P. L.; Geo. W. Vaughan, N. Y. C. & H. R.; M. H. Wickhorst.

Committee V—Track

1. Prepare typical plans for double slip crossings, double crossovers and guard rails.
2. Study the relation between worn flanges and worn switch points, with a view to correcting the causes and decreasing the number of derailments due to the combination of worn switch points and worn flanges on wheels.
3. Continue the study of economics of track labor.
4. Report on the design of manganese frogs and crossings.

J. B. Jenkins (chairman), B. & O.; G. J. Ray, D. L. & W.; Geo. H. Bremner, Interstate Commerce Commission; H. M. Church, B. & O.; Garrett Davis, C. R. I. & P.; J. M. R. Fairbairn, C. P. R.; T. H. Hickey, M. C.; E. T. Howson, *Railway Age Gazette;* L. J. F. Hughes, C. R. I. & P.; T. T. Irving, G. T. R.; J. R. Leighty, M. P.; A. C. Mackenzie, C. P. R.; P. C. Newbegin, B. & A.; F. B. Oren, I. C.; R. M. Pearce, P. & L. E.; H. T. Porter, B. & L. E.; E. Raymond, A. T. & S. F.; W. G. Raymond, State Univ. of Iowa; L. S. Rose, C. C. C. & St. L.; H. R. Safford, G. T.; C. H. Stein, C. R. R. of N. J.; W. I. Trench, B. & O.; A. H. Stone, K. C. T.

Committee VI—Buildings

1. Report on methods of heating, lighting and sanitary provisions for medium-sized stations.
2. Continue the study of the advantages and disadvantages of the various designs of freight houses and shop floors.
3. Present data on rest houses for employees.

M. A. Long (chairman), B. & O.; G. H. Gilbert, Q. & C.; G. W. Andrews, B. & O.; J. P. Canty, B. & M.; D. R. Collin, N. Y. C. & H. R.; C. G. Delo, C. G. W.; W. T. Dorrance, East Boston Terminal Railroad; C. H. Fake, M. R. & B. T.; A. T. Hawk, C. R. I. & P.; H. A. Lloyd, Erie; P. B. Roberts, G. T.; W. S. Thompson, P. R. R.

Committee VII—Wooden Bridges and Trestles

1. Continue study of the relative economy of repairs and renewals of wooden bridges and trestles.
2. Report on design of docks and wharves.
3. Report on developments in practice of ballast deck trestles since previous report.
4. Report on use of lag-screws for fastening guard timbers.

E. A. Frink (chairman), S. A. L.; W. H. Hoyt, D. M. & N.; H. Austill, Jr., M. & O.; J. E. Barrett, L. & H. R.; F. E. Bissell, civil engr.; H. C. Brown, Jr., I. C.; E. A. Hadley, M. P.; F. G. Hoskins, B. & O.; H. S. Jacoby, Cornell University; A. O. Ridgway, D. & R. G.; I. L. Simmons, C. R. I. & P.; D. W. Smith, H. V.; W. F. Steffens, N. Y. C.

Committee VIII—Masonry

1. Complete report on principles of design of plain and reinforced retaining walls and abutments.
2. Collect data concerning cost and method of constructing concrete piles, and make recommendations as to their use.
3. Report upon the cost, appearance and wearing qualities of various methods of surface finish for concrete.

F. E. Schall (chairman), L. V.; F. L. Thompson, I. C.; R. Armour, G. T.; John C. Beye, C. R. I. & P.; C. W. Boynton, Universal Portland Cement Company; H. A. Cassil, B. & O. S. W.; T. L. Condron, cons. engr.; J. K. Conner, L. E. & W.; L. J. Hotchkiss; Richard L. Humphrey, cons. engr.; J. H. Prior, C. M. & St. P.; R. A. Rutledge, A. T. & S. F.; G. H. Scribner, Jr., cont. engr.; Job Tuthill, K. C. T.; J. J. Yates, C. R. R. of N. J.

Committee IX—Signs, Fences and Crossings

1. Report on the economy of concrete and metal signs and signals as compared with wood.
2. Report on the economy of concrete and metal as compared with wood for fence posts.
3. Investigate methods used and comparative cost of repainting crossing and other signs; also present specifications for whitewashing cattle-guard wing fences.

W. F. Strouse (chairman), B. & O.; G. E. Boyd, D. L. & W.; R. B. Abbott, P. & R.; H. E. Billman, M. P.; E. T. Brown, B. & O.; A. C. Copland, C. & O.; Arthur Crumpton, G. T.; J. T. Frame, C. G. W.; L. E. Haislip, B. & O.; Maro Johnson, I. C.; L. C. Lawton, A. T. & S. F.; G. L. Moore, L. V.; Thomas Quigley, I. C.; C. H. Splitstone, Erie; W. D. Williams, C. N.

Committee X—Signals and Interlocking

1. Continue study of economics of labor in signal maintenance.
2. Formulate and present requisites for switch indicators, including conveying information on condition of the block to conductor and engineman.
3. Present, for approval, specifications adopted by the Railway Signal Association, which in the judgment of the committee, warrant consideration.
4. Study the problem of signaling single-track roads with reference to the effect of signaling and proper location of passing sidings on the capacity of the line.

Thos. S. Stevens (chairman), A. T. & S. F.; C. C. Anthony, P. R. R.; Azel Ames, cons. engr.; H. S. Balliet, Grand Central Terminal; J. B. Cameron, B. & O.; W. B. Causey, C. G. W.; C. A. Christofferson, N. P.; C. E. Denney, L. S. & M. S.; C. A. Dunham, G. N.; W. J. Eck, Southern; W. H. Elliott, N. Y. C. & H. R.; G. E. Ellis, K. C. T.; M. H. Hovey, cons. engr.; A. S. Ingalls, L. S. & M. S.; A. M. Keppel, Washington Terminal; J. C. Mock, Detroit River Tunnel; F. P. Patenall, B. & O.; J. A. Peabody, C. & N. W.; D. W. Richards, N. & W.; A. H. Rudd, P. R. R.; W. B. Scott, Sunset Central Lines; A. G. Shaver, C. R. I. & P.

COMMITTEE XI—RECORDS AND ACCOUNTS

1. Make a comprehensive study of the forms in the Manual, adopted a number of years ago, and bring forms up to date.

2. Continue the study of reports required by Federal and State Railway Commissions.

3. Continue the study of a feasible and useful sub-division of I. C. C. Classification Account No. 6, with a view to securing uniformity of labor costs.

W. A. Christian (chairman), C. G. W.; M. C. Byers, G. N.; F. J. Bachelder, B. & O.; W. S. Danes, Wabash; Lester Bernstein, B. & O.; G. D. Hill, I. C.; Huntington Smith, N. Y. C. & St. L.; Henry Lehn, N. Y. C. & H. R.; J. H. Milburn, B. & O.; J. W. Orrock, C. P. R.; J. C. Patterson, Erie; H. C. Phillips, A. T. & S. F.; J. H. Reinholdt, M. & St. L.; R. C. Sattley, C. R. I. & P.; Guy Scott, P. L. W.; H. M. Stout, N. P.; Frank Taylor, C. P. R.; J. L. Vollintine, C. B. & Q.; W. D. Wiggins, P. L. W.

COMMITTEE XII—RULES AND ORGANIZATION

1. Review rules and instructions heretofore adopted by the association and recommend such changes and additions thereto as may seem desirable.

2. Formulate rules for the guidance of the maintenance of way department pertaining to safety.

3. Continue the formulation of rules for the guidance of field parties: (a) When making preliminary surveys; (b) When making location surveys; (c) When in charge of construction.

4. Continue the study of science of organization.

G. D. Brooke (chairman), B. & O.; F. D. Anthony, D. & H.; R. P. Black, K. & M.; L. L. Beal, A. B. & A.; Ralph Budd, G. N.; A. M. Burt, N. P.; J. B. Carothers, B. & O. S. W.; S. E. Coombs, N. Y. C. & H. R.; C. Dougherty, Q. & C.; B. Herman, Southern; Jos. Mullen, C. C. C. & St. L.; E. T. Reisler, L. V.

COMMITTEE XIII—WATER SERVICE

1. Complete report on design and relative economy of track pans from an operating standpoint.

2. Report on deep well and deep well pumping and relative economy of this as compared with other sources of water supply.

3. Report on the use of compounds in locomotive boilers to counteract: (a) Foaming; (b) Scale formation.

4. Continue the study of recent developments in pumping machinery, and various kinds of fuels used.

A. F. Dorley (chairman), M. P.; J. L. Campbell, E. P. & S. W.; J. T. Andrews, B. & O.; F. T. Beckett, C. R. I. & P.; C. C. Cook, B. & O.; J. L. Downs, I. C.; R. H. Gaines, K. C. S.; W. S. Lacher, C. M. & St. P.; E. G. Lane, B. & O.; W. A. Parker, St. J. & G. I.; R. W. Willis, C. B. & Q.

COMMITTEE XIV—YARDS AND TERMINALS

1. Report on typical situation plans of passenger stations, of both through and stub types, with critical analysis of working capacity, and include a review of the different methods of estimating their capacity.

2. Report on developments in the handling of freight by mechanical means.

3. Report on developments in the design and operation of hump yards.

4. Continue study of track scales.

E. B. Temple (chairman), P. R. R.; B. H. Mann, M. P.; W. G. Arn, I. C.; H. Baldwin, C. C. C. & St. L.; G. H. Burgess, D. & H.; A. E. Clift, I. C.; L. G. Curtis, B. & O. C. T.; H. T. Douglas, Jr., C. & A.; A. C. Everham, K. C. T.; R. Ferriday, C. C. C. & St. L.; G. H. Herrold; D. B. Johnston, P. L. W.; H. A. Lane, B. & O.; B. M. McDonald, N. Y. C. & H. R.; L. J. McIntyre, N. P.; A. Montzheimer, E. J. & E.; H. J. Pfeifer, T. R. R. A. of St. Louis, Mo.; S. S. Roberts, cons. engr.; W. L. Seddon, S. A. L.; C. H. Spencer, Interstate Commerce Commission; E. E. R. Tratman, *Engineering News;* E. P. Weatherly, K. C. T.; W. L. Webb, C. M. & St. P.; C. C. Wentworth, N. & W.; J. G. Wishart, C. R. I. & P.

COMMITTEE XV—IRON AND STEEL STRUCTURES

1. Report on the methods of protection of iron and steel structures against corrosion.

2. Study designs and report on built-up columns, co-operating with other investigators and committees of other associations.

3. Report on design, length and operation of turntables.

4. Report on relative economy of various types of movable bridges.

A. J. Himes (chairman), N. Y. C. & St. L.; O. E. Selby, C. C. C. & St. L.; J. A. Bohland, G. N.; W. S. Bouton, B. & O.; A. W. Buel, cons. br. engr.; A. W. Carpenter, N. Y. C. & H. R.; Charles Chandler, I. C.; C. L. Crandall, Cornell University; J. E. Crawford, N. & W.; F. O. Dufour, Interstate Commerce Commission; W. R. Edwards, Interstate Commerce Commission; A. Chas. Irwin, C. M. & St. P.; B. R. Leffler, L. S. & M. S.; W. H. Moore, N. Y. N. H. & H.; P. B. Motley, C. P. R.; Albert Reichmann, American Bridge Company; C. E. Smith, M. P.; H. B. Stuart, G. T.; G. E. Tebbetts, K. C. T.; F. E. Turneaure, University of Wisconsin; L. F. Van Hagan, University of Wisconsin.

COMMITTEE XVI—ECONOMICS OF RAILWAY LOCATION

1. Study the question of grade, curvature, rise and fall, and distance, and, if possible, present conclusions as to reasonable values of same in a usable form, in order that they may be of use for the information and guidance of locating engineers.

2. Continue the important study of economics of railway operation heretofore carried on by the committee, in order that the information may lead to more economical methods in railway operation and that information may be obtained for correcting values given to the physical features in the locating of railways.

3. Make special efforts to collect information in regard to effects of passenger and freight traffic on the cost of maintenance.

John G. Sullivan (chairman), C. P. R.; C. P. Howard, cons. engr.; F. H. Alfred, P. M.; R. N. Begein, B. & O. S. W.; J. F. Burns, L. & N.; Maurice Coburn, Vandalia; A. C. Dennis, cont. engr.; A. S. Going, G. T.; F. W. Green, L. & A.; L. C. Hartley, C. & E. I.; P. M. LaBach, C. R. I. & P.; Fred Lavis, cons. engr.; J. de N. Macomb, A. T. & S. F.; C. W. P. Ramsey, C. P. R.; E. C. Schmidt, University of Illinois; A. K. Shurtleff, C. R. I. & P.; H. J. Simmons, E. P. & S. W.; F. W. Smith, cont. engr.; Walter Loring Webb, cons. engr.; M. A. Zook, Interstate Commerce Commission.

COMMITTEE XVII—WOOD PRESERVATION

1. Continue the study of the use of coal tar in creosote oil.

2. Continue the compilation of available information from service tests, supplementing this with reports of inspections to be made by members of the committee, of those sections of test track that have been in service long enough to give results.

3. Present specifications for timber to be treated.

4. Report on methods of accurately determining the absorption of creosote oil.

5. Study the subject of water in creosote.

Earl Stimson (chairman), B. & O.; E. H. Bowser, I. C.; H. B. Dick, B. & O. S. W.; C. F. Ford, C. R. I. & P.; Dr. W. K. Hatt, Purdue University; V. K. Hendricks, St. L. & S. F.; Jos. O. Osgood, C. R. R. of N. J.; George E. Rex, A. T. & S. F.; E. A. Sterling, cons. engr.; C. M. Taylor, C. R. R. of N. J. and P. & R.; Dr. Hermann Von Schrenk, cons. engr.; T. G. Townsend, Southern.

COMMITTEE XVIII—ELECTRICITY

1. Continue study of the subject of clearances.

2. Report on the effect of electrolytic action on metallic structures and best means of preventing it.

3. Continue the preparation of a standard specification for overhead transmission line crossings.

4. Continue the study of electrolysis and insulation and its effect upon reinforced concrete structures.

5. Report on maintenance organization with relation to track structures.

George W. Kittredge (chairman), N. Y. C. & H. R.; J. B. Austin, Jr., L. I.; D. J. Brumley, I. C.; R. D. Coombs, cons. engr.; A. O. Cunningham, Wabash; J. H. Davis, B. & O.; Walt Dennis, C. R. I. & P.; George Gibbs, P. R. R.; G. A. Harwood, N. Y. C. & H. R.; E. B. Katte, N. Y. C. & H. R.; C. E. Lindsay, N. Y. C. & H. R.; W. L. Morse, Jacksonville Terminal; W. S. Murray, cons. engr.; J. A. Peabody, C. & N. W.; J. W. Reid, C. & A.; Frank Rhea, Interstate Commerce Commission; A. F. Robinson, A. T. & S. F.; J. R. Savage, L. I.; Martin Schreiber, Public Service Railway, Newark, N. J.; A. G. Shaver, C. R. I. & P.; H. U. Wallace, Northern Colorado Power Company, Boulder, Col.

COMMITTEE XIX—CONSERVATION OF NATURAL RESOURCES

1. Continue the study of tree planting and general reforestation.

2. Continue the study of coal, fuel, oil and timber resources.

3. Continue the study of iron and steel resources.

C. H. Fisk (chairman), cons. engr.; A. W. Carpenter, N. Y. C. & H. R.; R. H. Aishton, C. & N. W.; Moses Burpee, B. & A.; F. F. Busteed, C. P. R.; A. L. Davis, I. C.; W. A. Hammel, A. B. & A.; William McNab, G. T.; G. A. Mountain, Canadian Railway Commission; A. L. Moorshead, Erie; Francis Lee Stuart, B. & O.; S. N. Williams, Cornell College; R. C. Young, L. S. & I.

GRADING OF LUMBER

1. Continue the collection of current specifications, grading and inspection rules for maintenance of way timber and lumber not heretofore reported on, and present same for all classes of maintenance of way timber and lumber, which will conserve the interests of railways and be acceptable to manufacturers' associations; conferring with committees of this association and with other organizations whose work is affected.

Dr. H. Von Schrenk (chairman), cons. engr.; B. A. Wood, M. & O.; W. McC. Bond, B. & O.; D. Fairchild, N. P.; R. Koehler, O.-W. R. & N.; A. J. Neafie, D. L. & W.; W. H. Norris, Maine Central; J. J. Taylor, K. C. S.

UNIFORM GENERAL CONTRACT FORMS

1. Continue the study of general contract forms, including forms for bond.

E. H. Lee (chairman), C. & W. I.; C. A. Wilson, cons. engr.; C. Frank Allen, Massachusetts Institute of Technology; W. G. Atwood, Interstate Commerce Commission; John P. Congdon, cons. engr.; Thos. Earle, Pennsylvania Steel Company; J. C. Irwin, B. & A.; R. G. Kenly, M. & St. L.; C. A. Paquette, C. C. C. & St. L.; J. H. Roach, L. S. & M. S.; H. A. Woods, G. T. P.

STRESSES IN TRACK

A. N. Talbot (chairman), University of Illinois; W. M. Dawley, Erie; A. S. Baldwin, I. C.; J. B. Berry, cons. engr.; C. H. Bremner, Interstate Commerce Commission; John Brunner, Illinois Steel Company; W. J. Burton, M. P.; Chas. S. Churchill, N. & W.; W. C. Cushing, P. L. W.; Dr. P. H. Dudley, N. Y. C. & H. R.; Emil Gerber, American Bridge Company; H. E. Hale, M. P.; Robt. W. Hunt, cons. engr.; J. B. Jenkins, B. & O.; George W. Kittredge, N. Y. C. & H. R.; P. M. LaBach, C. R. I. & P.; William McNab, G. T.; G. J. Ray, D. L. & W.; Earl Stimson, B. & O.; F. E. Turneaure, University of Wisconsin; J. E. Willoughby, A. C. L.

The Use of Coal Tar in the Creosoting Industry*

A Frank Discussion of This Growing Practice Showing Where It May Be Used and Results to Be Expected

By Hermann von Schrenk and Alfred L. Kammerer

For some years it has been the practice in a number of plants to add a certain percentage of refined low-carbon coal-tar to creosote oil of a certain grade. By "certain grade" a creosote oil is meant which has a specific gravity of approximately 1.03, or less, at 100 deg. F. This addition was made because it was found that by adding a small percentage of coal-tar to creosote of this grade, it was possible to make a heavier grade oil. A good deal of discussion has been aroused during recent years as to the propriety of adding refined coal-tar to creosote oil. In view of the fact that this practice has now grown to considerable proportions, it was thought advisable to prepare a brief statement, outlining the best information available with respect to this subject at the present time.

So far as known to the writers, refined coal-tar was first added, in the United States, to creosote oil used in the treatment of cross-ties, as a matter of standard practice, early in 1908. Since that time similar additions to creosote oil have been used at a number of large plants in various parts of the country. At about the same time that treatment was begun with the combination of refined coal-tar and creosote oil for the treatment of cross-ties, a similar practice started for the treatment of wooden paving blocks. The best information available indicates that this practice was inaugurated about 1907. Since that time, with few exceptions, the paving blocks treated in the United States have almost all been treated with a combination of coal-tar and creosote.

THE AMOUNT OF CREOSOTE-TAR COMBINATION USED

While it is not possible to give accurately the amounts of creosote and coal-tar used in combination, approximations can be made. From figures in possession of the writers, it has been found that since 1908, approximately 24,500,000 cross-ties have been treated and laid, treated with a coal-tar-creosote mixture at plants where the mixture was specifically specified. In addition to this number, a number, which it is impossible to estimate, have been treated at other plants, and the total number would probably considerably increase that first given. The reason it is impossible to give any accurate figures is because at many creosoting plants a mixture of coal-tar and creosote has been used for the treatment of ties and other materials on a straight creosote specification, without any mention of the fact that it is actually a mixture. The figures given by the writers are taken from the output of plants in which the coal-tar and creosote are mixed *at the plants* as a matter of standard practice. The 24,500,000 ties referred to have now been in the track anywhere from one to five years; that is, approximately 5,000,000 ties have been laid annually since 1910. Assuming that each tie was treated with approximately 2½ gal. of oil, and using the year 1912 as a basis of comparison, approximately 12,500,000 gal. of the coal-tar-creosote combination was used in 1912 at plants where this combination is required as standard practice. The total creosote oil used for all purposes in 1912 was 83,666,490 gal. In other words, for the plants referred to, the amount of oil used equaled about 14 per cent. of the total oil used. The writers believe that a very conservative estimate would show at least 40 per cent. of all the oil used at the present time in the United States to be a coal-tar-creosote combination.

WHAT COAL TAR IS

There seems to be considerable misunderstanding as to exactly what the compound is which is being added to creosote. Numerous references have been made from time to time referring to coal-tar additions in the sense of an "adulteration." Briefly stated, coal-tar is produced as a by-product in the destructive distillation of coal. Two distinct sources of this material should be recognized, one the product obtained in the destructive distillation of coal in by-product coke-ovens; the other, the product resulting from the destructive distillation of coal at retort gas works. These products are usually referred to as "coke-oven tar" and "gas-house tar."

The crude coal-tar, that is, the tar as it is first collected, is usually subjected to various processes of refinement, meaning by this the removal of water and the subsequent breaking-up of the coal-tar into various fractions. The substance usually referred to as refined tar (pertaining to the additions of coal-tar to creosote) is the crude tar from which the water and low-boiling oils have been removed. In other words, the refined tar is the crude coal-tar from which the lightest boiling oils and water have been taken. Creosote oil is one of the fractions of crude coal-tar obtained by the distillation of the coal-tar. It is a fraction coming off between the benzol and carbolic-acid compounds, which come off at low temperatures, and the pitch, which remains in the still at the highest temperatures. Creosote is therefore a part of coal-tar. Creosote has usually been made from gas-house tar, although large quantities are now being made from coke-oven tar. The principal point pertinent to this discussion is that creosote, as it is usually known, is simply a fraction of crude coal-tar.

Reference has been made to the fact that there are two types of coal-tar: gas-house tar and coke-oven tar. These two are practically identical so far as their chemical composition is concerned, but they differ very radically in one respect, namely, the percentage of free carbon found in the tar. Without going into details as to reasons it may be stated that the coke-oven tar usually has a low percentage of free carbon, the retort coal-gas tar a comparatively high percentage of free carbon.

Where refined tar has been added as a matter of standard practice, only low-carbon by-product coke-oven tar has been used. Retort coal-gas tar and certain grades of coke-oven tars are absolutely unfitted for the addition to creosote oil because of their high free-carbon content, unless this is removed either by mechanical methods or by filtration. It is possibly true that at many of the plants where coal-tar has been added to creosote oil, sufficient care has not always been used to see to it that only a low-carbon tar has been used. In other words, the writers are of the opinion that in many cases improper tars have been used.

The impression has prevailed in many places that the use of the coal-tar addition to creosote oil is a new proceeding. It may be of interest to note, therefore, that this is by no means the case. John Bethel, frequently called the "father of the creosoting industry," took out his patent, which may be regarded, as stated by Mr. Boulton, as the origin of the so-called creosoting process, in July, 1838. In this patent he specifies a mixture consisting of coal-tar thinned from one-third to one-half of its quantity with dead oil distilled from coal-tar.

The use of the crude tars added to the coal-tar or dead oil was gradually abandoned, due to the fact that it was recognized that the crude naphthas evaporated from the wood, owing to their low-boiling points and because it was believed that the pitch contained in the tar, when added in such large quantities as was then the practice, interfered with the proper injection of

*Abstract of appendix to report of the Committee on Wood Preservation presented before the annual convention of the American Railway Engineering Association, March 18, 1914.

the oil. The use of a slight addition of tar has, however, not been abandoned in England.

The writers have repeatedly observed that at most of the creosoting plants in England, particularly the commercial plants, coal-tar is being added to creosote oil today largely for the curious reason that it is impossible to make prospective purchasers regard timber as properly creosoted if creosote oil alone is used, because it has a very light brown color. The average consumer demands that creosoted timber look black, hence a slight addition of coal-tar is made even at the present day.

The relation between coal-tar and creosote oil, when the same are mixed, is of prime importance. The combination of the two has, unfortunately, been termed "a mixture." It would be much better to state that the relation of the two is in the nature of a solution. The term "mixture" implies that the relation of the two substances is really one such as is found when two unlike substances are mixed. As an actual matter of fact, the two materials have approximately the same chemical constituents, and when coal-tar is added to creosote oil, the two substances combine so thoroughly that it is impossible to separate them by any physical or chemical process.

The combination of coal-tar and creosote oil acts in every way like a heavier creosote. In fact, it requires a chemical determination of a somewhat refined character to be perfectly sure that any particular sample of creosote oil has had coal-tar added to it. There is nothing at all extraordinary about the fact that the two substances practically become one when it is remembered that coal-tar is the mother liquor from which creosote oil is distilled.

RELATION OF EVAPORATION

One of the principal reasons why coal-tar has been added to low-gravity creosote oils was to obtain an increased permanence for the resulting combination after it has once been injected into wood. The results of a good many years' experience in the use of creosote oil has shown that after creosote is injected into timber, a certain percentage evaporates from the wood. These percentages will be highest where creosote oils of low specific gravity are used. In other words, where creosote oils are used having comparatively high percentages of low-boiling compounds, a higher percentage of evaporation takes place. The most recent recommendations of all those who have made a study of the proper grade of creosote oil to be used in the treatment of timber are to the effect that the best results will be obtained by the use of the heaviest coal-tar creosotes.

With the large amount of creosote oil being used in the United States at the present time, a great deal of oil is offered for the creosoting of wood which does not fulfill the American Railway Engineering Association specification No. 1, that is, these oils have comparatively high percentages of low-boiling compounds. The writers have contended for many years that the use of such oils, except when they are used in larger quantities, will not give as good results as the use of the American Railway Engineering Association specification No. 1, particularly where such oils are used with one or the other of the so-called economical creosoting processes.

In order to determine what rate of evaporation occurs in creosote oils of various types, a large number of tests have been conducted during the last three or four years, the results of which are of particular interest at this time. Sufficient information is at hand to indicate that the addition of coal-tar to creosote oil gives assurance that a larger quantity of the original oil injected will remain in the wood than would have been the case if the creosote oil had been used by itself.

RELATION OF ANTISEPTIC PROPERTIES

For the last 50 years there has been a continued discussion as to which of the component parts of creosote oil should be regarded as the most valuable from an antiseptic standpoint. In spite of very considerable investigation, there is as yet no conclusive evidence as to which of the constituents of creosote oil are the most valuable from an antiseptic standpoint.

Irrespective of laboratory determinations, it seems to be an actual fact that the low-boiling oils injected into the timber disappear from the wood within a comparatively short period of time. The writers do not think that it is an exaggeration when it is stated that probably most of the low-boiling oils disappear in ten or twelve years, and in many cases probably sooner. It appears that there is only one conclusion which can be drawn from the numerous data developed during recent years, and that is that the heavy oil constituents, irrespective of what they may be considered chemically, are actually succeeding in preserving the wood.

Referring to some of the old timbers in detail, the percentage of oils distilling above 315 deg. C. are as follows:

	Per cent.
L. & N. piles, West Pascagoula, Ala., 28 years' service.....	49.03
Muskogee Wharf, Pensacola, Fla., 23 years' service.....	54.75
Galveston Bay Bridge, Santa Fe System, 28 years' service..	50.01
River Nene, England, 51 years.....	66.80
Galveston Bay Bridge, Santa Fe System, 28 years' service..	59.88
Galveston Bay Bridge, Santa Fe System, 28 years' service..	56.34
Railroad tie, Great Western Railroad, England, 24 years' service	71.5
Railroad tie, Great Western Railroad, England, 24 years' service	79.49
New Orleans paving block, 35 years, etc., etc.....	66.3

These timbers, as stated above, are in an excellent state of preservation, and there is no indication that they are beginning to decay. The oils contained in all of the timbers quoted consist of more than 50 per cent. distilling above 315 deg. It is, of course, impossible to say that these are in any way active in preserving the timber. It may be that the portions of the oil distilling below 315 deg. are the really effective agents in preserving the wood. Nevertheless, the fact remains that in the older timbers, which are perfectly sound, a very large percentage of the oil still in the wood is composed of the heaviest portions of creosote oil. It should be taken into consideration in any problem involving the question as to what parts of creosote are most effective in preventing decay, that long-term tests after all are more indicative as to what may be expected of the timber preservative than any laboratory test, which, however valuable it may be, must always be considered as indicative rather than a final proof.

Applying this discussion to the question of mixing a certain percentage of coal-tar with low-boiling creosote oil, it is not unreasonable to assume that by adding heavier compounds to a low-boiling oil, the permanence of this oil is thereby increased. No proof has yet been submitted which would indicate that the addition of these heavier compounds in any way reduced the antiseptic value of the creosote oil itself. On the contrary, it may materially aid in increasing the antiseptic value by the addition of compounds which will remain in the wood in a more or less permanent manner.

RELATION OF PENETRATION

Successful creosoting will always depend very largely upon the penetration secured. In other words, no timber can be considered as well-creosoted unless all sapwood is thoroughly penetrated in timbers which have an impenetrable heartwood, like pine, beech, etc., and unless complete penetration is obtained throughout the piece in timbers which have a penetrable heartwood, like some species of red oak. No criterion has been established to show relative penetration of different compounds. So far as is known to the writers, it will be almost impossible to establish a positive criterion, because the inherent variability of the wood fiber is so great that no two sticks can be found, which, if tested even under the same conditions of temperature and pressure, will permit making comparative tests as to the penetrating power of several liquids and obtain absolute results. The best that can be done is to select pieces from the same stick of wood and compare these by using different preservatives. The same piece will, however, show variations using the same liquid. The writers have made a good many tests of conditions governing the penetrability of creosote oils, and as a result of these tests, believe that there are certain fundamental conditions which

either favor or retard penetration. These are briefly as follows:

1. The presence or absence of a certain percentage of moisture.
2. The viscosity of the oil.
3. The character of the wood fiber to be penetrated; that is, its density and the condition of the walls are important factors.
4. The presence or absence of solid matter in the impregnating liquid.

In the writers' experience the relation between viscosity and penetration will hold almost universally for liquids of various types. It is exceedingly difficult to prove this, as has been stated, because it is hardly ever possible to completely eliminate the variable in the wood fiber. It can be approximated, however, by using a considerable number of pieces, using pieces of the same stick for different oils. Where this is carefully done and where every possible factor of moisture, density of wood fiber, etc., has been eliminated, the degree of penetration will increase as the viscosity decreases.

Taking all of the tests into consideration, the conclusion has been reached that for practical purposes the penetration obtainable with this type of mixture (that is, by mixing a percentage not to exceed 20 per cent. low-carbon coal-tar with creosote oil) is as good as that which can be obtained by using the creosote alone.

In actual practice the extent of penetration with creosote oil is usually determined by sawing a number of different ties, or pieces of lumber, and noting the actual penetration obtained. This is, to be sure, a very rough method and usually requires sawing a considerable number of different pieces. The variation in absorption and penetration for different pieces of wood is very great, even when the greatest care is taken to have the same species represented in any one treatment. Our decisions are frequently determined, however, by just such so-called practical tests.

One should not lose sight of the fact that it may take a slightly longer period of pressure to obtain the extent of penetration with the mixture than one can obtain with straight creosote, but practical experience at those plants where the combination of coal-tar and creosote oil has been used for several years, bears out the conclusion just made, that equally as good penetration can be obtained with the mixture as can be obtained with the creosote.

The only property of the coal-tar and creosote combination which might retard the penetration is the presence of a small amount of free carbon in the mixture. This free carbon filters out on the ends of the wood and it may to a certain extent retard the penetration of the oil. This retardant action is more apparent than real. Until recently it was supposed that none of the free carbon particles could penetrate the wood. Everyone has been struck with the fact that the wood treated with the coal-tar-creosote mixture, when cut into, is blacker than wood treated with creosote without the coal-tar addition. Not until recently, however, was it proven that carbon particles can actually enter into wood fiber with the oil.

The conclusions to be drawn, therefore, both from actual experience with pieces of wood as well as from theoretical consideration, are that the penetration which can be secured with the creosote to which approximately 20 per cent. of low carbon coal-tar has been added, will not in any way be inferior to that which could have been obtained had the same pieces of wood been treated with creosote alone. Any slight retardation, to whatever cause it may be due, can easily be made up by a slight increase in the time of pressure.

RELATION TO COST

In the president's address before the American Wood Preservers' Association in 1913, E. A. Sterling stated: "The procuring of an adequate supply of creosote at a reasonable cost may safely be considered as a vital factor in the wood preserving industry of the United States, even though other preservatives, including zinc chloride, are used in large quantities." The consumption of creosote in the United States in 1912 amounted approximately to 83,000,000 gal., of which about three-fourths was imported. This means that about 20,000,000 gal. was manufactured in the United States. Owing to the character of the crude tar from which the creosote oil is distilled and to varying market conditions, a considerable percentage of the oil furnished for consumption will not meet the standard specification No. 1 of the American Railway Engineering Association. These oils, however, are sold at a lower price than many of the imported oils which fulfill the specification No. 1 of the American Railway Engineering Association. The average consumer is consequently confronted with the alternative of buying an oil meeting the specification No. 1 and paying higher prices for the same or of buying an oil below this specification at a cheaper price. Given the alternative of buying the American Railway Engineering Association oil No. 1 or an oil which will not conform to this specification, there can be no question but that it is better policy to buy the highest grade oil, even at a higher price. The condition of the oil supply is such, however, that the amount of No. 1 oil is limited, and many consumers are forced either to buy the lower grade oil or to have none at all. Under these circumstances the question is: Shall the low-grade oil be used and how? Two alternatives suggest themselves to the writers in this connection. One is to use the low-grade oil in larger quantities, or to use the low-grade oil and add a certain percentage of coal-tar, which can be purchased at about the same price as the low-grade oil.

Where the oil is only slightly inferior to the American Railway Engineering Association specification No. 1, it will probably prove best to use larger quantities of such oil; where it is equal to the American Railway Engineering Association No. 3 oil, it is believed that the addition of coal-tar will be good policy, remembering the various considerations presented above. One will thereby obtain an oil, at a lower cost, which will have many of the qualities of the high-grade oil and which, to a certain extent, will do away with the necessity of using increased quantities.

Another point which should be considered in this connection is that we have, after all, practically no information as to the actual number of years which a given quantity of creosote oil of any grade will preserve any given piece of wood. Some railroads use about two gallons of creosote, or less, per tie, whereas others use about two and one-half gallons for the same sized ties. If two gallons is considered a good risk, the addition of a half gallon of coal-tar to two gallons of creosote oil is certainly as good a risk. In fact, with the retentive influence of the coal-tar, the probability is that the two original gallons of creosote oil to which coal-tar had been added will stay in the wood longer than the two gallons to which no coal-tar had been added. Whichever way one looks at it, therefore, the risk of adding coal-tar to creosote appears to be a fair one, and in many instances it may be better policy to use the combined oils rather than to use larger quantities of the poorer oil, particularly in connection with the economical creosoting processes so largely employed at the present time.

While cost considerations are of great importance, nothing herein is to be taken as implying that the decision as to whether coal-tar should be added to Nos. 2 or 3 A. R. E. A. oil should be based entirely on cost considerations. This phase of the matter will enter into the discussion only in such cases where a coal-tar addition is considered advisable, because of the difficulty or impossibility of getting No. 1 oil. There are many railroads in this country that can get No. 2 or No. 3 oil, not only at lower prices, but they can get such oils where they cannot get No. 1 oil, except at very advanced prices or not at all. In other words, the amount and quality

of the creosote available at any one particular point will be the first point to be considered, and where it is found that an adequate supply of Nos. 2 or 3 oil is available, then it will be time to consider the possibility of adding the coal-tar, both from the standpoint of getting the proper quantity of oil and at a lower cost than would have to be paid for the No. 1 oil.

One of the most important considerations is that if the coal-tar is used anywhere, it should be mixed with the creosote oil under the immediate direction of the railroad company, and with their full knowledge. The practice which has come about in various quarters of selling creosote oil mixed with coal-tar as a No. 1 specification oil should be stopped; and the caution is added that the greatest care should be taken, where timber is treated with creosote, where a No. 1 specification is called for, that the specification for such oil as printed in the Manual be rigidly enforced.

OPERATION OF A BALLAST CRUSHER AT COLEMAN, TEXAS

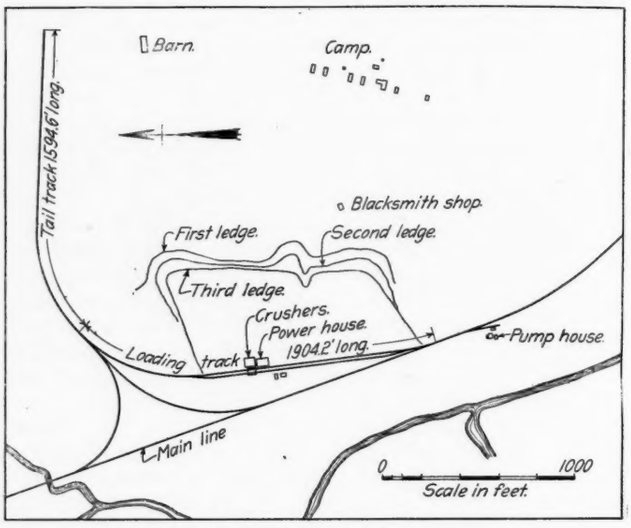
By Jos. Weidel
Assistant Engineer, Pecos & Northern Texas

During 1909, 1910 and 1911 the Pecos & Northern Texas Railway constructed a number of lines in the pan-handle of Texas, including those from Plainview to Lubbock, 45.8 miles; Plainview to Floydada, 26.5 miles; Lubbock to Coleman, 203.12 miles, and Slaton to Lamesa, 54.8 miles, a total of 330.22 miles.

That portion of the line which extends from Coleman to Lubbock via Sweetwater is what is known as the Coleman cut-off, described in the *Railway Age Gazette* for February 13, 1914. As it was the policy of the company to make this a first class trunk line throughout it was decided to ballast it with crushed rock.

Owing to the great distance of this locality from an existing rock crushing plant it was felt that a local supply should be developed if possible. A site about nine miles northwest of Coleman, known as Bachelor Prong, was selected as the most feasible location for a crusher. An outcropping of limestone rock indicated the following sequence of material from the top down, 8 ft. of limestone, 2.5 ft. of clay and shale, 4 ft. of limestone, 2.5 ft. of clay and shale and 10 ft. of limestone. While this was far from an ideal quarry, it was the best the country could afford. Accordingly, the company invited several crusher contractors to submit bids for 300,000 cu. yd. of crushed rock.

It finally developed that no one could be found who was willing to install a plant and enter into a contract of the kind mentioned above without the payment of a price per cubic yard deemed unreasonable by the company. Therefore, manufacturers of crusher and other machinery were asked to design a crusher plant to be owned and operated by the railway company, having a daily capacity of 1,000 cu. yd. exclusive of screenings, the main items of this plant consisting of one No. 8 "K" Gates breaker, one No. 6 "K" Gates breaker, one No. 5 "K" Gates breaker, one No. 8 "B" Gates elevator, one No. 7½ "B" Gates elevator, two 48 in. x 16 ft. Gates revolving screens, one 16 in. x 42 in. heavy duty Reliance Corliss engine, two 72 in. x 18 ft. Freeman tubular



Plat of Quarry and Crusher Layout

boilers, one 250 h. p. Cochrane feed water heater and one Ingersoll-Rand class AA high duty, steam driven, two-stage air compressor.

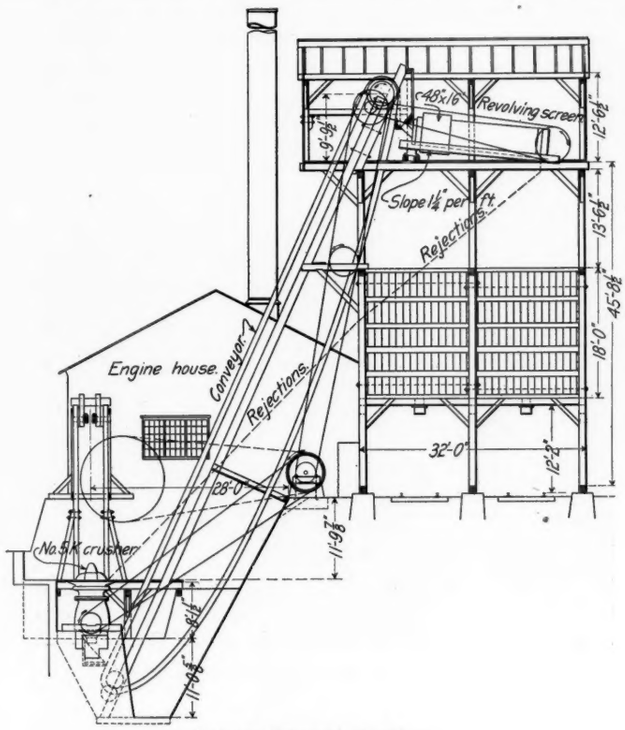
The plans for this installation were drawn up by the Allis Chalmers Company, of Milwaukee. In addition to the above there were purchased a supply of dump wagons, wheeled scrapers, grading plows, a full supply of blacksmith's and other tools and 28 mule teams. The general arrangement of the machinery within the plant and the relative position of the plant to tracks and quarry are shown on the accompanying map. The plant was constructed by company forces and the machinery was installed by company forces, under the direction of an expert furnished by the Allis Chalmers Company.

View of Crusher and General View of Quarry

On October 1, 1911, the plant was put in operation under the immediate direction of an experienced crusher superintendent. The method of quarrying consists in removing the top ledge of rock for some distance, then stripping the layer of clay underlying the rock, then taking out the second layer of rock, then stripping the second layer of clay and then

taking out the third layer of rock. This gives the quarry a terraced appearance and involves much team work.

The strippings are deposited within the pit behind the last layer of rock that is taken out. The rock lies in seams and the bottom layer of the lowest ledge is left in the quarry to serve as a working floor. The drilling is done by Ingersoll-Rand drills mounted on tripods, which are driven by compressed air piped to the required site from the power house. Mexican labor is used for loading the rock onto dump wagons and these are hauled to the crusher by mule teams. Upon arrival at the crusher the loads are dumped into the No. 8 crusher, from whence the crushed rock is raised by elevator to screen No. 1. All rock passing through a 2 in. screen and which is held by a ½ in. dust jacket passes into the rock bins. The screenings pass into a separate compartment. The rejections are returned to the No. 6 crusher, through which they pass and are crushed and are then ele-



Section Through Crusher

vated to the No. 2 screen, where they pass through the same process as before described, except that the rejections are then returnd to the No. 5 crusher, whose product passes into the same hopper as that of No. 6.

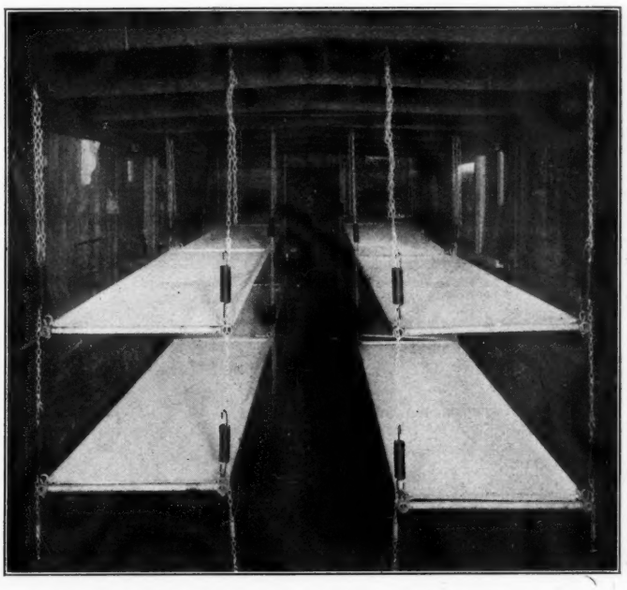
A daily statement is given below, showing the manner of keeping a record of costs, the forces employed, the organization and the output.

Average Cost per Cu. Yd. of Producing Crushed Rock at Coleman Crusher During 1913

Superintendence	.015
Drilling (includes stripping and quarrying)	.156
Loading rock	.077
Hauling rock to crusher	.035
Crushing	.036
Total labor	.319
Fuel	.025
Oil and waste	.004
Tools and supplies	.037
Powder, fuse and caps	.061
Water and ice	.005
Commercial freight	.027
Total material	.159
Interest, 5 per cent.; depreciation, 20 per cent.; total, 25 per cent.	.093
Total cost per cu. yd. f. o. b. cars	.571
Total cost per cu. yd., less value of screenings at 20c. per cu. yd.	.525

AN INTERESTING STEEL BUNK INSTALLATION

The Gosso steel bunk for use in railway camps was described in the *Railway Age Gazette* of March 19, page 657. Since that time an installation has just been completed for the Chicago, Milwaukee & St. Paul, and the interior of one of these cars is shown in the accompanying photograph. Fifty double deck beds sufficient for a camp of 100 men, were installed in cars at the West Milwaukee shops for the use of a gang employed between Milwaukee and Chicago. Under the arrangements existing on

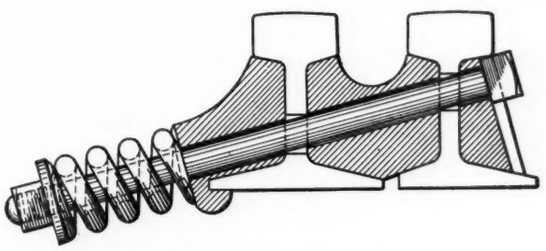


Gosso Steel Bunks Installed in C., M. & St. P. Camp Car

this road, the railroad company pays the initial expense of the bunk and erects them in the cars. The boarding contractor then maintains them and guarantees them for a period of 10 years, erecting them and taking them down for storage each year. The labor required to erect eight double deck beds per car in this camp amounted to eight hours as compared with about 40 hours per car required to construct the old wooden bunks. These bunks are made by the Gosso Company, Chicago.

THE SHOFFNER CUSHIONED GUARD RAIL FASTENING

Although simple in general design, a guard rail is a source of considerable expense and trouble in maintenance. The rail frequently cuts down badly where the wheel flanges come in contact with it at the throat, and where it is rigidly connected with the main rail there is always more or less trouble with broken bolts and filler blocks. To overcome these disadvantages,

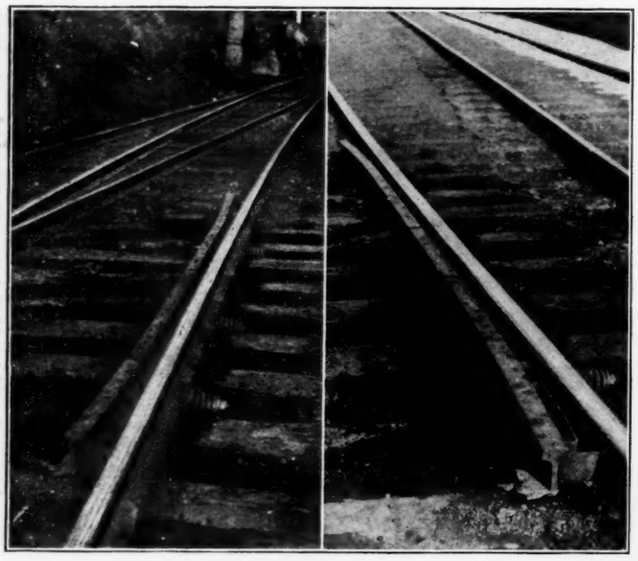


Section of Shoffner Cushioned Guard Rail Fastening

a cushioned guard rail fastening has been developed and a number have been in continuous service for almost five years on the Norfolk & Western, where they have been subjected to very severe service. Up to this time all of the fastenings are said

to have given satisfactory service, only one bolt having been broken, and this being due to defective material. It is also said that no adjustment of these fastenings has been required from the time they were installed.

This fastening consists essentially of a bolt inclined downward, passing through the main and guard rails and filler blocks and provided with a spring at the lower end. As a wheel enters the flangeway and comes in contact with the wing of the guard rail, the shock is absorbed by the spring, reducing the resultant cutting and wear of the guard rail and preventing the forcing of the guard rail out of its proper position opposite the point of the crossing. The design of the filler block and the downward inclination of the bolt also tend to prevent the guard rail from



The Shoffner Cushioned Guard Rail Fastening in Service

standing above the main track rail. The recoil of the spring brings the rail back into its proper position after the wheel has passed, thereby maintaining the proper throat distance, while the design of the filler block causes the blow received by the head of the guard rail to be transmitted to the base of the running rail. This device has been patented by E. J. Shoffner, Roanoke, Va., and is being sold by the Virginia Railway Supply Company, Dickson building, Norfolk, Va.

A NEW TYPE OF CAR BUFFER

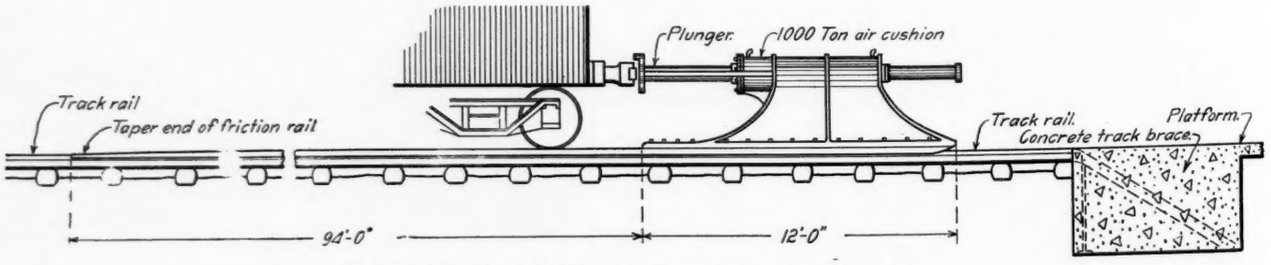
A unique design of car buffer which utilizes air compression, vacuum, rail friction, and vise friction in stopping a train, has been worked out by the MacDonald Car Buffer, Ltd., Pittsburgh, Pa., for use both in stub end passenger terminals and at the ends of yard tracks. It is understood that the Canadian Pacific has just placed an order for several of these buffers and that the Pittsburgh & Lake Erie and the Pennsylvania Lines West intend to install a number of them at an early date.

The most noteworthy feature of the design is the provision made for absorbing the momentum of the train by the movement of the complete device along the track rails, thereby greatly reducing the damage to equipment. The initial shock is taken by a plunger working in an air cylinder capable of absorbing a force of 1,000 tons. This cylinder is mounted on a large casting which is bolted to a friction rail with an inverted "U" cross section extending 94 ft. in front of the front edge of the casting, and tapered at its extreme end to make its top level with the track rail. The engine or car coming in contact with the buffer must rest entirely on this rail. Special joints are provided for connecting the end of the friction rail to the track rail in a manner that will allow it to slide when necessary.

The air plunger has a movement of 3 ft. and will stop a 1,000-ton train moving at 3 miles per hour without any movement of the buffer. If the plunger does not absorb the force of the blow, the entire buffer slides over the track rail and the friction developed under the weight of the device itself and the engine or car resting on the friction rail soon overcomes the remaining momentum at 4 miles per hour, the 1,000-ton train would move the buffer 9 in. and at 8 miles 3 ft. A pit

Rear View of Buffer Installed in a Freight Yard

filled with concrete is located at the end of station tracks with the track rails turned down into the concrete to form a solid brace, preventing damage to the track structure. When the buffer has been displaced, it can easily be pulled back by a locomotive. A number of tests made at Sherbrooke, Que., between June 7 and September 28, 1912, and similar tests made at Pittsburgh, Pa., between June 10 and September 9, 1913, showed that the buffer was capable of stopping trains weighing 1,000 tons at speeds as high as 32 miles per hour. At this maximum speed the displacement of the buffer was 40 ft.



General Elevation of Buffer for Passenger Station Installation

General News Department

The Lake Shore & Michigan Southern last week reduced the working hours of its shop forces at Elkhart, Ind., from nine to eight hours a day.

The shops of the International & Great Northern at Palestine, Tex., have been closed, with the exception of the car department, for an indefinite period.

The Erie has announced that beginning April 15, its Ohio division will operate on eastern standard time instead of central standard time, as at present.

A press despatch from Pittsburgh says that the larger independent steel firms have decided to make some reduction in wages because of foreign competition.

A suit was filed in the United States court at Salt Lake City, Utah, on April 7, to recover a total of $13,500 in fines against the Denver & Rio Grande for 27 alleged violations of the hours of service law.

In the Federal Court at Cincinnati, April 9, a conductor of the Chesapeake & Ohio, running between that city and Chicago, was arrested on the charge of violating the interstate commerce law in carrying a passenger for $3 when the fare was $6.10.

The coach shops of the Oregon Short Line at Ogden, Utah, were closed indefinitely on April 1. Seventy-five men had been employed at these shops. Some of the work heretofore done at Ogden will be transferred to the shops at Pocatello, Idaho.

On a train of the Rock Island Road near Little Rock, Ark., on the night of April 9, a robber got into the express car and overpowered the messenger and locked him up in a trunk, bound and gagged. The robber or robbers then rifled the safe and got away before they were discovered.

The United States Civil Service Commission announces a competitive examination for the position of rodman and chainman to fill vacancies in the Interstate Commerce Commission for the work of valuation; salary from $720 to $1,080 yearly. Applications will be received at any time, and will be considered every three months, or as frequently as the needs of the service may require.

Charles S. Mellen, who was under indictment for manslaughter in connection with the Westport wreck of the New York, New Haven & Hartford, has been discharged from custody on the recommendation of the attorney-general of Connecticut and the state's attorney of Hartford county because of lack of evidence to connect Mr. Mellen directly with the causes of the wreck, and especially of any gross negligence.

Following the practice of a good many New York hotels and restaurants, the Pennsylvania Railroad is making a charge of 10 cents for bread and butter, both in its dining cars and at its restaurants in stations. At the same time that this charge was put into effect the price of the table d'hote dinner served on the Congressional Limited between New York and Washington was raised from $1 to $1.25. The New York Central is now charging 10 cents for "service."

The electrification of the New York, New Haven & Hartford from Stamford, Conn., to New Haven will be finished about June 1, when the company will be in a position to run trains by electric power through from New York to New Haven, 74 miles. For the present only a part of the trains can be hauled by electric locomotives for the reason that there are not enough motors, and also because the single power house, at Cos Cob, is not large enough to provide current for all of the trains. The question of the construction of another power house and of the purchase of more electric locomotives must wait until the financial condition of the company is more settled.

W. T. Lechlider, superintendent of the Cleveland division of the Baltimore & Ohio, has issued a circular to all employees informing them that each employee on the division is appointed a member of the "Cleveland Division Efficiency Committee." To make the appeal concrete he gives the following illustration: Locomotive Engineer Harrison Lynch overheard a conversation between officers in regard to economy, and after reflecting a bit, concluded that he could pick up air hose fittings to some profit. When he returned from his next trip he had with him five good angle cocks with hose nipples still in them, and nine hose clutches. This action on the part of Mr. Lynch saved $15.95.

James Hamilton Lewis has introduced three bills in the Senate, one providing for government ownership of all interstate railroads; another authorizing the government to build 100 ships, to be built in America, chartered to any part of the world as a government merchant marine, and to be an adjunct to the navy in time of war; the third abolishing the Interstate Commerce Commission and creating in its place a commission of 21 members divided into three branches as follows: One branch to control interstate commerce by rail or steamship, another to have jurisdiction over banking and finance, and the third over factories and interstate manufactories and interstate shipments of manufactured merchandise. The bill providing for government ownership would provide for a bond issue to pay for the roads and their lease to private companies for operation.

The Chicago *Tribune* on April 10 published the following: "The *Tribune* printed on April 1 a despatch from Washington on the interstate commerce rate hearing, at which President Willard of the Baltimore & Ohio and President Delano of the Wabash, now president of the Chicago, Indianapolis & Louisville, were witnesses. The despatch stated that 'Mr. Willard and Mr. Delano admitted the general charge made by Clifford Thorne that the railroads manipulated their maintenance accounts to suit their policy. They denied his inference, however, that they had manipulated these accounts to influence the decision in the present case.' In the heading over this despatch the *Tribune* said: 'Willard and Delano Admit Juggling of Maintenance Figures to Thorne.' Mr. Delano protests that he did not admit juggling of figures, that he was asked no questions that would bring forth such an admission, and further that he has juggled no figures. An examination of the transcript of the evidence confirms Mr. Delano's contention, and the *Tribune* is glad to make this correction."

Two New Haven Derailments

On Sunday morning, April 12, the Green Mountain Express of the New York, New Haven & Hartford, which had left Grand Central station, New York, at 8:04 a. m. for Montreal, was derailed about a mile east of Harrison, N. Y. The engineman and a mail clerk were the only injured, the engineman receiving a scalp wound and the mail clerk injury to his back. The train was drawn by two electric locomotives and had two mail cars, two passenger coaches and a Pullman chair car. The electric locomotives and the two mail cars left the tracks and smashed through two pillars supporting the bridges carrying the overhead trolley wires. All four tracks of the road were blocked for nearly three hours, the short circuit, however, caused by the breaking of the trolley wire shutting off the current so that no damage was done from electricity. There is a long curve, between 3 and 4 deg., just west of the point at which the electric locomotive left the track, and apparently the locomotive left the track almost at the point at which the curve ran into the tangent.

No official inquiry has as yet been completed, but the engineman is understood to have said that he was going about 55 miles an hour and that apparently something dropped down under the locomotive and derailed it. The ties showed that the pony truck, which carries very little weight, left the rails some distance before the drivers. The New Haven has been engaged in the last year in extensive work of taking out all dangerous

curves, especially in the electrified zone, and of making the approaches to curves more easy.

The other derailment occurred at Clayton, Conn. In this accident it is supposed that the rails spread, although the exact cause of the derailment has not yet been determined. The fireman was killed and some of the passengers were injured.

Commissioner Clark on the Present Rate Situation

Commissioner Clark has written a letter to A. A. Housman & Co., New York, in which he says in part:

"The commission has no powers except those specifically delegated to it by law. It has no power to approve or disapprove of a rate except 'after full hearing.' It may be that it would have been a good thing for the railroads and certain other interests if the commission had, without full investigation, immediately approved the proposed general increase in freight rates, but it seems to me that if that had been done in this instance it would be an invitation not only for the roads in other sections of the country to immediately follow with like requests, but for the roads in the territory immediately involved to present an additional request of the same nature if they thought that such action would be to their interests.

"Whatever the transportation charges are the consumers have to pay them, and we think that the consumers' interests are not to be entirely lost sight of.

"I have never felt and do not now feel that one or two black sheep in a flock make the entire flock black. I do not condemn all railroads' financing or all railroad managements because some of their financing and some of their management is both indefensible and inexcusable, any more than I condemn the Christian religion because occasionally a bad man is found in the clergyman's coat.

"I have not been able to quite understand why in this instance a propaganda of importunities, criticism and abuse has been launched against the commission because it did not decide a question which had not yet been submitted to it. The tariffs proposing these increased rates were filed to become effective November 15. The duty rests upon the commission to give full hearings and to properly investigate the reasonableness and necessity for the increases, and the question of reasonableness is not at all a one-sided question. It means that the charges shall be reasonable for the carrier and for the shipper.

"We have been taking testimony in this situation almost continuously, and there has been no policy of delay on the part of the commission and no delay attributable to us which is fairly the subject of any criticism whatever. The railroads completed the submission or testimony in the proceedings within the last twenty-four hours. The protestants against the increases have not completed their testimony. The commission has arranged to hear oral argument on the main question involved during the latter part of this month, that being the earliest date within which the parties who desire to argue it could properly prepare for argument and prepare their briefs.

"The commission is proceeding in an orderly way and in a judicial spirit. We do not understand that the law contemplates or that it would be in any sense proper for the commission to determine questions of this importance upon the basis of which side could secure the largest number of petitioners, which side could make the most noise, or which could indulge in the most abuse.

"We are glad to have the expression of views of those who are interested, and we undertake to give due and proper consideration to every view thus properly expressed, and we shall endeavor to do our duty on the premises, realizing, of course, that we must assume and meet responsibility for our action."

Supplementary Arbitration of Trainmen's Wages

The board which adjudicated the wages of conductors and trainmen on the eastern railroads last November met again in New York City last week to settle questions which had arisen in carrying out the award. The arbitrators are: Seth Low, chairman of the board; John H. Finley, A. H. Smith, John G. Walber (acting in place of W. W. Atterbury), L. E. Sheppard and D. L. Cease. Rulings are made on 134 questions. The last article in the award, P., caused most difficulty. This provides that no pay shall be reduced; but stipulates that if old rates are continued the men must accept old conditions also. This chiefly affects men whose regularly assigned runs exceed ten hours a day; and these may keep their present rates and conditions, while those whose days are less than ten hours long may take the new rates and conditions.

It was provided originally that the committees of the conductors' and trainmen's organizations should jointly decide whether they prefer the new rates and accompanying conditions or the old rates and accompanying conditions for each pool or set of runs, by taking up each schedule and eliminating therefrom every trip or special provision which was absorbed by the award. In connection with this these questions were asked:—"In which of four ways can men exercise option— (a) All members of crew together? (b) All conductors in the pool, set of runs or assignments? All trainmen other than conductors, in the pool, set of runs or assignments? (c) Each occupation in the pool, set of runs or assignment? (d) Each individual?"

The answer was:—

"The men can exercise option by each occupation in the pool, set of runs or assignments; that is to say, separately as conductors, baggagemen, flagmen and brakemen."

The two intermediate arbitrators, Seth Low and Dr. John H. Finley, added a memorandum on this article. They said:—

"Owing to the highly technical character of the questions involved, the intermediate arbitrators failed to appreciate, when joining in the award, that general regulations such as this, applying to all runs and to all the men on a road, were involved in the option contained in article P.

"Were the arbitrators free to do so they would prefer to give the article at this time the significance which they intended it to have; namely, that it should apply only to anomalous runs. The question of their right to do this under the terms of the law was submitted, with the consent of the board, to Alton B. Parker, former chief judge of the New York Court of Appeals, who advised that it is not now within the power of the board to make this ruling.

"This being the case, the intermediate arbitrators hope that the fact of this difference between the award as made and the award as understood by them will be taken into consideration both by the railroads and the men in applying the award."

Other questions asked cover such points as monthly minimums, combinations of short and long runs and daily guarantees. The arbitrators further said:—

"In undertaking to arbitrate the rates of pay for forty-one railroads simultaneously many complications are necessarily met with, which make it difficult, if not impossible, to reconcile the differences and adjust the intricacies of the different schedules."

In a point raised as to whether a crew can be used in extra work in case it does not run a sufficient number of days to be covered by its guarantee of wages per month the board replied in the affirmative. In answering another question the board ruled that in combining short freight trips the railroads should be limited to an aggregate of 100 miles.

An Improved Speed Recorder

Charles Edmonds, a mechanic in the shops of the Baltimore & Ohio at Baltimore, has invented and patented a visual and audible annunciator, to be attached to the speed recorders used on Baltimore & Ohio locomotives. A gong fixed in the cab is sounded, and an electric light is energized, whenever the speed of the locomotive, as indicated by the recorder, rises above a certain prescribed rate. The light continues to show and the gong continues to ring while the train is running a distance of about 8,000 ft.

The International Railway Fuel Association

The sixth annual meeting of the International Railway Fuel Association will be held at Hotel LaSalle, Chicago, May 18 to 21, 1914. The executive committee has selected a list of subjects that should be of mutual interest to representatives of both railroads and coal companies. Papers will be presented as follows: Storage of Coal—Its Feasibility and Advantages to Producer, Carrier and Consumer; Sizing of Coal for Locomotive Use; A Uniform Method of Computing Locomotive Fuel Consumption for Office Statistics and Trip Performance; Honeycombing and Clinker Formation; Coal Space and Adjuncts of Locomotive Tenders; Relation of Front End Design and Air Openings of Grates and Ash Pans to Fuel Consumption and

Sparks; Economies in Roundhouse and Terminal Fuel Consumption, and Pre-heating of Feed Water for Locomotive Boilers.

The Cleveland Engineering Society

At the semi-monthly meeting of the Cleveland Engineering Society in the Chamber of Commerce building, Cleveland, Ohio, on April 28, a paper will be presented by Alexander C. Brown, vice-president of the Brown Hoisting Machinery Company, Cleveland, entitled "The Application of the Locomotive Crane to Modern Industries."

Railway Signal Association

The summer meeting of the Railway Signal Association will be held at Hotel Astor, Broadway and Forty-fourth street, New York City, May 27 and 28.

MEETINGS AND CONVENTIONS

The following list gives names of secretaries, dates of next or regular meetings, and places of meeting.

Air Brake Association.—F. M. Nellis, 53 State St., Boston, Mass. Next convention, May 5-8, Hotel Pontchartrain, Detroit, Mich.

American Association of Demurrage Officers.—A. G. Thomason, Boston, Mass. Convention, April 21, St. Louis.

American Association of General Passenger and Ticket Agents.—W. C. Hope, 143 Liberty St., New York.

American Association of Freight Agents.—R. O. Wells, I. C. R. R., East St. Louis, Ill. Next convention, April 21, Rice Hotel, Houston, Tex.

American Association of Railroad Superintendents.—E. H. Harman, St. Louis, Mo.; 3d Thursday and Friday in May.

American Electric Railway Association.—E. B. Burritt, 29 W. 39th St., New York.

American Electric Railway Manufacturers' Assoc.—H. G. McConnaughy, 165 Broadway, New York. Meetings with Am. Elec. Ry. Assoc.

American Railway Association.—W. F. Allen. 75 Church St., New York.

American Railway Bridge and Building Association.—C. A. Lichty, C. & N. W., Chicago. Next convention, October 20-22, 1914, Los Angeles, Cal.

American Railway Engineering Association.—E. H. Fritch, 900 S. Michigan Ave., Chicago.

American Railway Master Mechanics' Association.—J. W. Taylor, Karpen Building, Chicago. June 15-17, Atlantic City, N. J.

American Railway Tool Foremen's Association.—A. R. Davis, Central of Georgia, Macon, Ga. Next convention, July 20-22, Hotel Sherman, Chicago.

American Society for Testing Materials.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa. Next annual meeting, June 30 to July 4, Hotel Traymore, Atlantic City, N. J.

American Society of Civil Engineers.—Chas. W. Hunt, 220 West 57th St., New York; 1st and 3d Wed., except June, July and August, New York. Annual convention, June 2-5, Baltimore, Md.

American Society of Engineering Contractors.—J. R. Wemlinger, 11 Broadway, New York; 2d Thursday of each month, at 2 P. M., 11 Broadway, New York.

American Society of Mechanical Engineers.—Calvin W. Rice, 29 W. 39th St., New York. June 16-19, St. Paul-Minneapolis, Minn.

American Wood Preservers' Association.—F. J. Angier, B. & O., Baltimore, Md. Next convention, January 19-21, 1915, Chicago.

Association of American Railway Accounting Officers.—C. G. Phillips, Highland Park, Ill. Annual meeting, June 24, Minneapolis, Minn.

Association of Railway Claim Agents.—C. W. Egan, B. & O., Baltimore, Md. Next convention, May, St. Paul, Minn.

Association of Railway Electrical Engineers.—Jos. A. Andreucetti, C. & N. W. Ry., Chicago. Semi-annual meeting, June 12, Hotel Denis, Atlantic City, N. J. Annual convention, October 19-23, Chicago.

Association of Railway Telegraph Superintendents.—P. W. Drew, 112 West Adams St., Chicago. Next convention, May 19-22, New Orleans, La.

Association of Transportation and Car Accounting Officers.—G. P. Conard, 75 Church St., New York. Annual meeting, Hotel Chalfont, Atlantic City, N. J., June 18-19.

Association of Water Line Accounting Officers.—W. R. Evans, Chamber of Commerce, Buffalo, N. Y.

Bridge and Building Supply Men's Association.—L. D. Mitchell, Detroit Graphite Co., Detroit, Mich. Meeting with American Railway Bridge and Building Association.

Canadian Railway Club.—James Powell, Grand Trunk Ry., Montreal, Que.; 2d Tuesday in month, except June, July and August, Windsor Hotel, Montreal.

Canadian Society of Civil Engineers.—Clement H. McLeod, 176 Mansfield St., Montreal, Que.; 1st Thursday, October, November, December, February, March and April, Montreal.

Car Foremen's Association of Chicago.—Aaron Kline, 841 Lawler Ave., Chicago; 2d Monday in month, except July and August, Lytton Bldg., Chicago.

Central Railway Club.—H. D. Vought, 95 Liberty St., New York; 2d Fri. in Jan., May, Sept. and Nov. and 2d Thurs. in March, Hotel Statler, Buffalo, N. Y.

Civil Engineers' Society of St. Paul.—Edw. J. Dugan, P. O. Box 654, St. Paul, Minn.; 2d Monday, except June, July, August and September, Old State Capitol Bldg., St. Paul.

Engineers' Society of Pennsylvania.—Edw. R. Dasher, Box 75, Harrisburg, Pa.; 1st Friday after 10th of each month, except July and August, 31 So. Front St., Harrisburg, Pa.

Engineers' Society of Western Pennsylvania.—Elmer K. Hiles, Oliver Bldg., Pittsburgh; 1st and 3d Tuesday, Pittsburgh, Pa.

Freight Claim Association.—Warren P. Taylor, Richmond, Va. Next convention, May 13, Hotel Galvez, Galveston, Tex.

General Superintendents' Association of Chicago.—A. M. Hunter, 605 Grand Central Station, Chicago; Wed. preceding 3d Thurs., Transportation Bldg., Chicago.

International Railway Congress.—Executive Committee, 11, rue de Louvain, Brussels, Belgium. Convention, 1915, Berlin.

International Railway Fuel Association.—C. G. Hall, 922 McCormick Bldg., Chicago. Annual convention, May 18-21, Hotel La Salle, Chicago.

International Railway General Foremen's Association.—Wm. Hall, 829 West Broadway, Winona, Minn. Next convention, July 14-17, Hotel Sherman, Chicago.

International Railroad Master Blacksmiths' Association.—A. L. Woodworth, Lima, Ohio. Next convention, third Tuesday in August.

Maintenance of Way Master Printers' Association of the United States and Canada.—T. I. Goodwin, C. R. I. & P., Eldon, Mo. Next convention, November 17-19, 1914, Detroit, Mich.

Master Boiler Makers' Association.—Harry D. Vought, 95 Liberty St., New York. Next annual meeting, May 25-28, Hotel Walton, Philadelphia.

Master Car Builders' Association.—J. W. Taylor, Karpen building, Chicago. June 10-12, Atlantic City, N. J.

Master Car & Locomotive Painters' Assoc. of U. S. and Canada.—A. P. Dane, B. & M., Reading, Mass. Next convention, September 8-11, Nashville, Tenn.

National Railway Appliances Association.—Bruce V. Crandall, 537 So. Dearborn St., Chicago. Next convention, March 15 to 19, 1915, Chicago.

New England Railroad Club.—W. E. Cade, Jr., 683 Atlantic Ave., Boston, Mass.; 2d Tuesday in month, except June, July, Aug. and Sept., Boston.

New York Railroad Club.—H. D. Vought, 95 Liberty St., New York; 3d Friday in month, except June, July and August, New York.

Niagara Frontier Car Men's Association.—E. Frankenberger, 623 Brisbane Bldg., Buffalo, N. Y. Meetings monthly.

Peoria Association of Railroad Officers.—M. W. Rotchford, Union Station, Peoria, Ill.; 2d Thursday in month, Jefferson Hotel, Peoria.

Railroad Club of Kansas City.—C. Manlove, 1008 Walnut St., Kansas City, Mo.; 3d Friday in month, Kansas City.

Railroad Master Tinners, Coppersmiths & Pipefitters' Association.—U. G. Thompson, C. & E. I., Danville, Ill. Annual meeting, May 19-22, Marquette Hotel, St. Louis, Mo.

Railway Business Association.—Frank W. Noxon, 30 Church St., New York.

Railway Club of Pittsburgh.—J. B. Anderson, Penna. R. R., Pittsburgh, Pa.; 4th Friday in month, except June, July and August, Pittsburgh.

Railway Development Association.—W. Nicholson, Kansas City Southern, Kansas City, Mo.

Railway Electrical Supply Manufacturers' Assoc.—J. Scribner, 1021 Monadnock Block, Chicago. Meetings with Assoc. Ry. Elec. Engrs.

Railway Fire Protection Association.—C. B. Edwards, Mobile & Ohio, Mobile, Ala. Annual meeting, 1st Tuesday in October.

Railway Gardening Association.—J. S. Butterfield, Lee's Summit, Mo.

Railway Signal Association.—C. C. Rosenberg, Bethlehem, Pa. New York, May 27 and 28. Annual meeting, Bluff Point, N. Y., September 22-24.

Railway Storekeepers' Association.—J. P. Murphy, Box C, Collinwood, Ohio. Next convention, May 18-20, Hotel Raleigh, Washington, D. C.

Railway Supply Manufacturers' Association.—J. D. Conway, 2136 Oliver Bldg., Pittsburgh, Pa. Meetings with M. C. B. and M. M. Associations. Atlantic City, June 10 to 17.

Railway Telegraph & Telephone Appliance Association.—G. A. Nelson, 50 Church St., New York. Meetings with Assoc. of Ry. Teleg. Supts.

Richmond Railroad Club.—F. O. Robinson, C. & O., Richmond, Va.; 2d Monday in month, except June, July and August.

Roadmasters' and Maintenance of Way Association.—L. C. Ryan, C. & N. W., Sterling, Ill. Next convention, September 8-10, 1914, Chicago.

St. Louis Railway Club.—B. W. Frauenthal, Union Station, St. Louis, Mo.; 2d Friday in month, except June, July and Aug., St. Louis.

Salt Lake City Transportation Club.—R. E. Rowland, Hotel Utah Bldg., Salt Lake City, Utah; 1st Saturday of each month, Salt Lake City.

Signal Appliance Association.—F. W. Edmunds, 3868 Park Ave., New York. Meeting with annual convention Railway Signal Association.

Society of Railway Financial Officers.—Carl Nyquist, La Salle St. Station, Chicago.

Southern Association of Car Service Officers.—E. W. Sandwich, A. & W. P. Ry., Montgomery, Ala.

Southern & Southwestern Railway Club.—A. J. Merrill, Grant bldg., Atlanta, Ga.; 3d Thurs., Jan., March, May, July, Sept., Nov., 10 a. m., Candler Bldg., Atlanta.

Toledo Transportation Club.—J. S. Marks, Agent, Interstate Despatch, Toledo, Ohio; 1st Saturday in month, Boody House, Toledo.

Track Supply Association.—W. C. Kidd, Ramapo Iron Works, Hillsburn, N. Y. Meetings with Roadmasters' and Maintenance of Way Association.

Traffic Club of Chicago.—W. H. Wharton, La Salle Hotel, Chicago.

Traffic Club of New York.—C. A. Swope, 291 Broadway, New York; last Tuesday in month, except June, July and August, Waldorf-Astoria, New York.

Traffic Club of Pittsburgh.—D. L. Wells, Erie R. R., Pittsburgh, Pa.; meetings bimonthly, Pittsburgh. Annual meeting, 2d Monday in June.

Traffic Club of St. Louis.—A. F. Versen, Mercantile Library building, St. Louis, Mo. Annual meeting in November. Noonday meetings October to May.

Train Despatchers' Association of America.—J. F. Mackie, 7122 Stewart Ave., Chicago. Next convention, June 16, Jacksonville, Fla.

Transportation Club of Buffalo.—J. M. Sells, Buffalo; first Saturday after first Wednesday.

Transportation Club of Detroit.—W. R. Hurley, Supt.'s office, L. S. & M. S., Detroit, Mich.; meetings monthly, Normandie Hotel, Detroit.

Traveling Engineers' Association.—W. O. Thompson, N. Y. C. & H. R., East Buffalo, N. Y. Next meeting, August, Chicago.

Utah Society of Engineers.—Fred D. Ulmer, Oregon Short Line, Salt Lake City, Utah; 3d Friday of each month, except July and August.

Western Canada Railway Club.—W. H. Rosevear, P. O. Box 1707, Winnipeg, Man.; 2d Monday, except June, July and August, Winnipeg.

Western Railway Club.—J. W. Taylor, 1112 Karpen building, Chicago; 3d Tuesday of each month, except June, July and August, Karpen building, Chicago.

Western Society of Engineers.—J. H. Warder, 1735 Monadnock Block, Chicago; regular meeting 1st Monday in month, except January, July and August, Chicago. Extra meetings, except in July and August, generally on other Monday evenings.

REVENUES AND EXPENSES OF RAILWAYS

SEVEN MONTHS ENDING JANUARY 31, 1914—CONTINUED

Name of road.	Average mileage operated during period.	Operating revenues			Maintenance		Operating expenses				Net operating revenue (or deficit).	Outside operations, net.	Taxes.	Operating income (or loss).	Increase (or decr.) comp. with last year.
		Freight.	Passenger.	Total. inc. misc.	Way and structures.	Of equipment.	Traffic.	Trans-portation.	General.	Total.					
Duluth, Missabe & Northern	358	$5,334,386	$231,462	$5,621,223	$632,213	$631,983	$17,050	$1,082,888	$108,508	$2,472,643	$3,148,579	$19,412	$320,165	$2,847,826	—$72,398
Duluth, South Shore & Atlantic	627	1,224,112	715,655	2,082,427	487,576	247,516	60,513	765,898	79,561	1,641,066	441,360	8,091	139,634	309,816	6,051
Duluth, Winnipeg & Pacific	181	874,435	175,762	1,070,122	193,603	151,176	14,142	393,494	40,429	792,848	277,274	.....	53,529	223,744	89,628
El Paso & Southwestern	982	4,225,201	718,022	5,173,087	848,951	736,209	110,108	1,481,233	184,638	3,361,142	1,811,945	—17,016	296,170	1,498,758	—453,544
Elgin, Joliet & Eastern	803	6,604,488	30	7,073,259	1,101,752	1,475,597	41,568	2,076,590	155,901	4,851,410	2,221,849	.....	220,809	2,001,039	—1,368,823
Erie	1,987	23,093,958	5,954,460	31,685,397	4,075,497	6,011,122	743,048	11,135,280	748,641	22,713,589	8,971,807	—139,854	1,096,915	7,735,037	—2,222,815
Florence & Cripple Creek	86	575,953	139,087	728,678	103,610	68,971	15,295	207,857	29,949	425,684	302,993	.....	28,032	274,961	—50,338
Florida East Coast	678	1,303,049	953,569	2,569,746	528,336	454,170	58,165	996,898	79,844	2,117,415	452,331	1,339	140,000	313,670	—83,834
Fort Worth & Denver City	454	1,951,798	966,075	3,068,218	384,959	478,512	51,542	1,186,887	110,297	2,212,199	856,019	—3,770	115,952	736,296	—447,563
Galveston, Harrisburg & San Antonio	1,338	4,833,213	1,910,075	7,124,195	840,240	1,359,638	244,164	2,917,821	240,293	5,602,119	1,522,076	—20,362	388,402	1,113,311	—515,301
Georgia R. R. Lessee Organization	307	1,329,077	580,845	2,048,750	206,716	347,190	81,542	903,904	61,892	1,601,246	447,503	.....	20,148	427,354	266,855
Georgia Southern & Florida	395	867,564	524,714	1,575,467	197,890	307,653	57,903	630,900	70,604	1,264,952	310,515	—487	80,340	229,686	4,730
Grand Rapids & Indiana	575	1,908,560	1,254,091	3,416,331	464,636	515,937	90,556	1,464,195	110,751	2,646,078	770,252	—2,632	168,605	599,014	—131,108
Grand Trunk Western	347	2,604,102	1,411,782	4,265,266	509,718	767,613	160,324	1,963,302	124,253	3,525,211	740,054	—11,862	220,500	507,691	—490,831
Great Northern	7,765	36,192,101	9,873,786	49,235,051	6,653,752	5,875,934	788,056	12,981,093	830,475	27,129,293	22,105,757	115,618	2,636,728	19,584,648	—1,234,401
Gulf & Ship Island	307	915,018	251,035	1,244,290	151,606	233,614	20,425	331,316	58,899	795,863	448,427	.....	52,988	395,438	17,110
Gulf, Colorado & Santa Fe	1,595	5,792,718	1,924,861	8,187,465	1,348,101	1,247,176	184,793	3,055,518	224,624	6,060,214	2,127,251	.....	383,297	1,743,954	—689,373
Hocking Valley	351	3,829,551	585,386	4,737,729	480,846	936,975	66,968	1,550,357	104,932	3,140,080	1,597,648	.....	284,400	1,313,248	—179,168
Houston & Texas Central	789	2,777,080	1,199,367	4,261,380	596,180	579,206	106,474	1,891,985	129,073	3,302,921	958,459	—947	210,841	746,670	—215,659
Houston East & West Texas	190	550,349	251,175	850,496	120,786	88,781	13,852	358,680	29,367	611,470	239,026	.....	36,427	202,598	—414
Illinois Central	4,762	26,461,462	8,490,361	39,851,124	5,658,280	8,707,916	762,688	14,389,648	938,009	30,456,543	9,394,581	—13,236	1,868,716	7,512,627	648,439
Indiana Harbor Belt	104	.....	.....	1,887,180	280,871	238,056	20,271	903,759	53,990	1,496,949	390,231	19,707	45,541	364,396	—193,481
International & Great Northern	1,159	4,634,505	1,446,650	6,495,182	947,361	755,357	158,812	2,677,366	233,709	4,799,608	1,695,573	—11,974	184,841	1,498,757	—469,952
Kanawha & Michigan	176	1,685,504	235,249	1,967,096	274,048	451,118	19,885	598,110	49,156	1,392,289	574,806	—35	71,009	503,761	—176,158
Kansas City Southern	827	4,675,376	1,054,297	6,373,083	616,080	768,202	187,764	2,104,919	249,921	3,926,888	2,446,195	.....	293,164	2,153,030	—106,616
Lake Erie & Western	905	2,735,961	547,367	3,492,192	570,762	715,176	106,956	1,399,556	86,344	2,878,796	613,395	.....	153,640	459,755	—382,166
Lake Shore & Michigan Southern	1,858	20,986,615	8,099,144	32,881,961	4,487,732	7,920,714	633,663	11,734,591	679,065	25,455,766	7,426,194	45,990	1,425,712	6,046,473	—5,597,088
Lehigh & Hudson River	96	966,218	31,726	1,054,770	194,302	170,219	10,100	409,325	30,124	814,071	240,698	.....	28,000	212,698	—119,333
Lehigh & New England	285	1,094,540	8,489	1,141,116	148,930	154,802	14,345	303,856	27,447	649,383	491,733	.....	22,528	469,205	—24,526
Lehigh Valley	1,438	20,053,788	3,039,326	23,957,908	2,787,232	4,320,073	604,091	8,372,611	508,099	16,592,108	7,365,800	—163,601	880,000	6,322,198	—1,656,962
Long Island	398	1,957,544	4,835,095	7,614,220	941,323	861,687	118,620	3,251,011	195,637	5,368,280	2,245,940	—22,645	454,929	1,768,365	—374,432
Louisiana & Arkansas	271	798,310	169,470	1,000,650	187,228	147,686	17,635	257,288	36,112	645,952	354,698	.....	34,248	320,449	4,008
Louisiana Ry. & Navigation Co	350	952,237	180,211	1,207,015	229,073	140,588	43,825	479,009	45,371	937,868	269,146	.....	43,750	225,396	—63,816
Louisiana Western R. R	207	847,720	439,258	1,353,094	140,784	287,561	52,268	435,298	46,130	962,042	391,051	—1,541	74,809	314,700	—89,083
Louisville & Nashville	4,923	26,235,185	8,079,621	36,570,281	5,642,113	7,331,904	771,415	12,364,592	745,328	26,855,353	9,714,927	3,374	1,139,918	8,578,383	—218,715
Louisville, Henderson & St. Louis	199	515,293	251,276	815,624	160,454	104,862	32,757	274,925	22,481	595,481	220,143	1,744	25,200	196,687	104,677
Maine Central	1,206	4,277,999	2,234,492	6,950,140	1,091,032	1,069,572	87,087	2,681,251	191,380	5,120,324	1,829,816	—21,792	337,390	1,470,633	—223,185
Michigan Central	1,799	12,983,491	5,831,967	20,850,891	3,006,812	3,790,652	456,312	8,940,060	381,018	16,634,856	4,216,034	—9,560	830,813	3,375,660	—2,265,063
Midland Valley	373	683,148	297,386	1,031,772	221,662	182,277	17,866	363,589	44,718	830,115	201,657	390	45,972	156,074	—6,926
Minneapolis & St. Louis	1,585	4,274,536	1,214,239	5,835,098	813,432	787,505	121,707	2,171,883	138,345	4,032,874	1,802,223	—299	237,969	1,563,954	—150,081
Minneapolis, St. Paul & Sault Ste. Marie	3,977	12,721,923	4,424,288	18,208,855	2,229,013	2,746,143	389,681	5,757,602	375,056	11,497,496	6,711,359	108,304	746,509	6,073,154	—1,911,636
Missouri & North Arkansas	365	483,394	264,083	794,364	195,953	135,978	25,895	305,794	38,997	702,620	91,744	.....	38,500	53,244	56,958
Missouri, Kansas & Texas	3,816	12,887,572	5,880,773	20,091,976	3,092,475	2,494,743	436,277	7,543,032	697,680	14,264,208	5,827,768	—86,146	903,397	4,838,224	—1,362,322
Missouri, Oklahoma & Gulf	332	563,290	155,865	748,715	141,307	120,320	39,236	340,631	45,911	687,407	61,307	3,132	42,000	22,440	—75,011
Missouri Pacific	3,919	12,213,821	3,030,116	16,614,460	2,750,751	3,119,419	418,747	6,852,781	487,640	13,629,340	2,985,119	—24,982	669,243	2,290,893	—636,057
Mobile & Ohio	1,122	6,312,424	948,997	7,717,898	893,224	1,521,299	284,700	2,911,705	231,788	5,842,718	1,875,180	9,209	242,312	1,623,658	—140,268
Monongahela	66	845,525	19,985	888,496	118,754	52,805	2,937	181,699	14,912	371,109	517,386	.....	16,450	500,936	—73,989
Monongahela Connecting	6	.....	.....	586,942	62,546	113,081	2,100	274,201	17,533	469,463	117,479	.....	20,001	97,478	—68,665
Morgan's Louisiana & Texas	404	2,013,616	696,926	2,938,512	330,588	457,387	85,993	1,175,077	88,981	2,138,028	800,434	—11,296	170,454	618,734	184,168
Nashville, Chattanooga & St. Louis	1,231	5,167,006	1,916,119	7,625,293	1,208,985	1,443,029	298,594	2,863,170	216,914	6,030,693	1,594,599	—6,988	177,380	1,410,230	—180,603
Nevada Northern	165	946,280	89,761	1,061,504	118,689	135,929	2,908	250,157	31,970	539,655	521,848	.....	54,813	467,035	21,661
New Orleans & Northeastern	203	1,832,868	390,401	2,386,750	239,184	521,210	70,964	909,810	90,876	1,832,046	554,703	2,474	111,263	440,965	21,118
New Orleans Great Northern	282	805,308	240,675	1,134,768	154,915	121,063	19,444	327,447	52,756	675,626	459,142	—645	17,668	440,827	89,152
New Orleans, Mobile & Chicago	403	1,033,678	230,801	1,340,705	185,673	137,211	26,816	419,037	53,728	822,467	518,238	—733	54,774	462,730	10,052
New Orleans, Texas & Mexico	285	788,187	131,590	977,742	244,206	86,126	22,901	378,559	63,481	795,274	182,468	.....	7,444	175,023	—33,904
New York Central & Hudson River	3,751	40,085,533	21,856,827	69,401,291	10,193,562	13,749,785	1,339,123	25,523,762	1,722,973	52,529,207	16,872,084	—66,450	3,579,009	13,226,623	—3,160,001
New York, Chicago & St. Louis	565	5,905,417	1,041,550	7,185,868	915,190	1,099,214	345,169	3,183,858	133,022	5,676,454	1,509,414	—19,368	278,213	1,211,832	—895,912
New York, New Haven & Hartford	2,074	19,154,837	16,817,284	39,989,993	5,140,716	5,953,822	300,579	16,109,395	1,056,910	28,561,424	11,428,568	56,094	2,120,000	9,364,662	3,498,283
New York, Ontario & Western	565	4,045,466	1,203,304	5,534,445	838,493	976,300	73,028	2,048,658	117,299	4,053,780	1,480,665	—10,399	132,300	1,337,965	—436,935
New York, Philadelphia & Norfolk	112	1,794,941	332,577	2,288,535	194,990	499,308	37,586	1,017,424	97,576	1,846,886	441,648	.....	59,700	381,948	—123,368
New York, Susquehanna & Western	150	1,228,499	335,186	1,756,298	226,327	219,657	17,400	728,472	47,806	1,239,663	516,635	—15,684	105,487	395,463	4,591
Norfolk & Western	2,035	22,790,655	3,080,719	26,818,367	3,155,169	5,461,218	431,629	8,508,056	536,316	18,092,390	8,725,976	—12,217	920,000	7,793,759	—979,450
Norfolk Southern	831	1,512,992	601,535	2,300,513	312,239	311,511	40,697	791,377	121,351	1,577,176	723,336	6,357	72,264	657,429	—65,614
Northern Central	472	5,939,187	1,571,499	8,054,756	966,941	1,820,582	128,116	3,921,125	193,080	7,029,846	1,024,910	5,311	300,823	729,397	—476,859

REVENUES AND EXPENSES OF RAILWAYS

SEVEN MONTHS ENDING JANUARY 31, 1914—CONTINUED

Name of road.	Average mileage operated during period.	Operating revenues			Operating expenses						Net operating revenue (or deficit).	Outside operations, net.	Taxes.	Operating income (or loss).	Increase (or decr.) comp. with last year.
					Maintenance										
		Freight.	Passenger.	Total. inc. misc.	Way and structures.	Of equipment.	Traffic.	Transportation.	General.	Total.					
Northern Pacific	6,313	$30,701,654	$10,085,608	$43,498,789	$5,796,192	$5,170,067	$743,514	$13,650,705	$625,314	$25,985,794	$17,512,995	$290,662	$2,657,739	$15,145,917	—$1,900,142
Northwestern Pacific	400	924,497	1,204,707	2,295,651	362,427	285,004	27,775	804,133	83,993	1,563,334	732,317	.....	105,700	626,617	—49,094
Oregon Short Line	2,032	9,966,876	3,113,063	13,951,110	1,657,847	1,685,569	262,157	3,462,574	377,221	7,445,369	6,505,740	—13,597	942,571	5,549,570	—595,602
Oregon-Wash. R. R. & Navigation Co.	1,914	6,964,940	3,106,518	10,832,406	1,587,355	1,267,063	364,299	3,739,470	421,402	7,379,591	3,452,814	—3,720	788,879	2,626,725	—592,499
Pecos & Northern Texas	481	1,099,480	290,107	1,469,545	157,732	257,935	19,730	446,106	47,417	928,922	540,623	.....	54,337	486,285	—27,863
Pennsylvania *Co.*	1,749	28,739,059	6,311,179	38,853,400	5,459,099	7,170,107	637,697	14,553,872	802,181	28,622,658	10,230,742	—75,434	1,921,379	8,233,928	—2,380,784
Pennsylvania *R. R.*	4,043	78,602,068	23,330,417	109,737,093	14,148,846	22,771,346	1,590,188	40,506,956	2,628,133	81,645,471	28,091,621	—1,110,333	4,367,304	22,613,983	—1,979,614
*Peoria & Eastern	...	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Pere Marquette	2,324	6,597,577	2,589,713	10,087,629	1,574,375	2,432,940	240,399	4,318,882	294,500	8,861,098	122,653	—28,782	351,729	846,019	—1,238,585
Philadelphia & Reading	1,020	22,783,801	4,351,865	28,451,287	2,925,529	5,144,286	312,838	9,554,802	449,154	18,386,611	10,064,676	154,980	718,484	9,501,171	2,741,965
Philadelphia, Baltimore & Washington	717	6,080,259	5,043,508	12,405,705	1,964,922	2,312,653	250,334	5,419,924	331,423	10,279,259	2,126,446	.....	385,031	1,741,414	—545,656
Pittsburgh & Lake Erie	223	9,246,515	1,133,040	10,768,107	1,143,407	2,205,822	116,283	2,773,683	206,117	6,445,314	4,322,793	—3,308	422,385	3,897,099	—1,962,655
Pittsburgh, Cincinnati, Chic. & St. Louis.	1,472	17,840,907	5,523,743	26,355,168	3,922,785	5,257,830	535,567	10,310,693	544,145	20,571,022	5,784,145	—4,377	1,128,185	4,651,582	—1,814,762
Pittsburgh, Shawmut & Northern	282	1,243,504	79,108	1,341,281	294,616	354,602	12,424	473,621	36,467	1,171,732	169,549	.....	12,825	156,723	162,054
Port Reading	21	747,644	.....	760,181	99,259	635	273	240,479	3,321	343,971	416,210	21,517	79,000	358,727	271,695
Richmond, Fredericksburg & Potomac	87	837,094	571,556	1,616,039	167,827	196,819	21,501	626,327	51,020	1,063,496	552,542	—11,153	57,779	483,608	—97,202
Rutland R. R.	468	1,179,948	813,037	2,302,428	261,412	422,332	67,525	872,220	45,629	1,669,121	633,306	553	120,391	513,469	34,824
St. Joseph & Grand Island	318	689,387	222,872	991,948	187,048	150,755	35,163	422,795	44,224	839,987	151,960	64	51,535	100,489	—5,111
St. Louis & San Francisco	4,741	17,778,394	6,761,285	26,350,266	4,059,828	4,276,523	503,402	8,714,234	708,489	18,262,479	8,087,787	.....	849,763	7,838,024	—1,114,071
St. Louis, Brownsville & Mexico	517	857,906	509,271	1,497,036	352,034	167,624	34,232	559,293	75,247	1,188,432	308,603	.....	55,728	252,874	—54,489
St. Louis, Iron Mountain & Southern	3,364	15,026,336	3,882,582	20,280,242	2,776,020	3,180,724	380,556	6,010,781	514,448	12,862,531	7,417,711	—16,554	707,973	6,693,184	629,750
St. Louis Merchants' Bridge Terminal	9	.....	2,627	1,176,598	241,256	85,050	5,080	622,159	42,844	996,391	180,206	.....	41,900	138,306	—157,173
St. Louis, San Francisco & Texas	243	686,475	245,090	988,464	176,951	139,841	16,153	378,759	39,071	750,777	237,687	.....	10,987	226,699	—21,146
St. Louis Southwestern	910	3,879,102	932,900	5,095,524	474,614	929,139	206,979	1,202,171	194,257	3,007,163	2,088,361	—9,457	221,511	1,857,392	—224,080
St. Louis Southwestern Ry. Co. of Texas	810	1,963,760	819,184	2,994,388	678,334	701,685	96,183	1,174,460	146,332	2,796,996	197,392	—1,906	134,761	60,724	—407,893
San Antonio & Aransas Pass	724	2,028,447	874,360	3,067,939	601,640	433,670	44,914	1,148,923	82,768	2,311,916	756,023	.....	90,000	666,023	—434,191
San Pedro, Los Angeles & Salt Lake	1,133	3,859,377	1,853,705	6,168,075	734,496	1,046,179	224,585	2,091,910	128,385	4,225,557	1,942,518	—19,159	279,552	1,643,806	—206,657
Seaboard Air Line	3,081	9,825,885	3,170,161	14,452,603	1,881,461	1,964,820	456,677	5,309,509	434,785	10,047,255	4,405,348	—12,289	574,000	3,819,058	259,080
Southern Kansas Ry. Co. of Texas	179	630,697	115,024	781,727	100,705	151,034	11,038	241,584	25,476	529,840	251,887	.....	27,410	224,477	—127,893
Southern Pacific	6,382	32,763,898	18,367,261	55,361,710	6,084,523	7,742,697	1,116,148	15,681,464	1,648,383	32,273,218	23,088,492	808,819	2,942,695	20,954,616	—3,056,968
Southern Railway	7,036	26,964,340	11,797,884	41,999,994	5,410,418	6,929,414	1,293,772	14,471,431	1,239,170	29,344,207	12,655,786	39,927	1,526,929	11,168,784	—266,763
Southern Ry. Co. in Mississippi	280	481,828	284,260	830,081	175,896	74,751	16,687	329,164	28,391	624,892	205,188	.....	62,066	143,122	59,105
Spokane International	163	464,748	154,519	643,384	99,400	38,112	13,795	189,806	26,321	367,436	278,947	.....	26,070	252,877	—8,190
Spokane, Portland & Seattle	556	1,784,598	1,015,234	3,054,504	433,165	267,367	57,290	752,893	93,757	1,604,474	1,450,029	3,044	373,800	1,079,273	—311,341
Tennessee Central	293	690,288	272,211	1,019,879	197,338	118,111	39,937	354,084	51,321	760,793	259,086	.....	29,735	229,350	16,525
Terminal R. R. Association of St. Louis	33	.....	1,476	1,700,003	281,512	141,447	6,495	663,768	40,784	1,134,008	565,995	48,815	199,865	414,945	—174,411
Texas & New Orleans	458	1,590,071	761,533	2,514,328	415,288	574,763	59,875	1,029,267	91,999	2,171,195	343,133	9,685	137,996	214,823	—42,364
Texas & Pacific	1,884	8,001,889	2,971,095	11,760,435	1,405,154	1,742,331	266,895	4,768,195	301,384	8,483,961	3,276,474	—26,372	420,540	2,829,560	604,643
Toledo & Ohio Central	442	3,044,737	418,083	3,667,104	656,597	741,079	59,166	1,428,293	72,763	2,957,900	709,204	—3,942	148,584	556,676	—315,980
Toledo, Peoria & Western	247	446,924	311,815	808,400	163,017	207,799	17,393	355,354	25,958	769,523	38,876	.....	40,400	—1,523	—152,784
Toledo, St. Louis & Western	450	2,400,682	234,768	2,802,201	293,647	372,121	114,777	1,011,462	64,781	1,856,791	945,409	.....	113,300	832,109	104,425
Trinity & Brazos Valley	462	1,178,001	357,426	1,598,461	378,899	228,215	73,206	736,210	87,459	1,503,991	94,469	.....	41,667	52,802	—332,425
Ulster & Delaware	128	391,532	250,564	677,924	93,443	91,393	10,360	295,063	26,856	517,116	160,807	516	24,500	136,824	—42,242
Union R. R. Co. of Pennsylvania	31	.....	.....	2,760,628	378,791	708,429	712	1,151,964	32,603	2,272,501	488,126	27,053	67,500	447,680	—513,511
Union R. R. Co. of Baltimore	9	823,018	164,696	1,001,064	81,369	.....	7,621	35,052	18,156	142,199	858,865	.....	41,010	817,854	—36,658
Union Pacific	3,612	22,826,481	6,670,679	32,438,812	3,355,919	4,351,689	749,525	8,520,030	887,368	17,864,534	14,574,278	—61,478	1,313,914	13,198,886	—1,030,293
Vandalia	910	4,726,330	1,550,703	7,027,623	888,315	1,303,734	190,654	2,725,112	142,609	5,250,427	1,777,195	.....	220,055	1,557,139	—152,134
Vicksburg, Shreveport & Pacific	171	631,530	372,479	1,091,193	175,446	206,860	24,855	362,440	37,138	806,741	284,452	—1,769	47,861	234,821	10,787
Virginia & Southwestern	240	1,021,845	116,773	1,171,045	157,773	273,378	15,154	330,445	27,459	804,212	366,833	.....	43,160	323,672	46,332
Virginian Railway	503	3,597,585	242,600	3,939,902	499,247	608,111	38,873	898,155	68,526	2,112,914	1,826,988	50,789	152,795	1,724,983	434,491
Wabash	2,514	12,398,836	4,608,403	18,597,471	2,279,516	3,374,619	622,571	7,545,506	501,976	14,324,191	4,273,280	—31,781	548,351	3,693,147	—620,412
Washington Southern	35	254,411	281,295	718,847	99,973	101,648	8,585	297,542	21,921	529,670	189,177	—1,095	24,463	163,618	—44,936
West Jersey & Seashore	355	1,096,424	2,741,552	4,097,166	623,071	643,234	128,811	1,691,965	95,298	3,182,381	914,784	—21,606	182,063	711,115	—232,867
Western Maryland	661	4,078,541	682,912	4,973,897	788,294	812,103	166,365	2,295,188	134,975	4,196,928	776,968	.....	147,100	629,868	—294,790
Western Pacific	936	3,005,276	768,933	3,875,164	822,920	446,250	202,566	1,396,820	188,569	3,057,126	818,038	—13,583	226,347	578,106	—347,562
Western Railway of Alabama	133	502,271	340,040	910,538	155,153	174,123	43,368	251,224	41,306	665,177	245,360	367	34,633	211,095	3,104
Wheeling & Lake Erie	459	4,332,326	400,960	5,009,524	726,825	876,685	59,409	1,637,508	124,673	3,425,101	1,584,422	—785	220,793	1,362,843	—115,137
Yazoo & Mississippi Valley	1,371	5,610,545	1,849,418	7,945,690	1,085,961	1,095,227	108,984	2,789,229	191,559	5,270,962	2,674,728	—2,860	301,000	2,370,867	994,923

* Included with the Big Four, since January 1.

Traffic News

Members of the board of directors of the Altoona, Pa., Chamber of Commerce have gone on record as favoring the granting of the increased freight rates asked by the eastern railroads.

At the request of the United States Military Academy at West Point, the Chicago, Milwaukee & St. Paul has supplied several hundred copies of its advertising literature on the northwest to be used as class texts.

The season of spring colonist fares on the western railways closed on April 15. The reports from the various lines indicate that the season has been a poor one, and that traffic to the northwestern states and to the southwestern states has been very much less than it was a year ago.

The Southern Pacific has announced a reduction in the rate on wine in glass, boxed or in barrels from terminal points in California to New York, from 75 to 65 cents per hundred pounds. The company has also made provision that grape shipments may be stopped once in transit at any point east of Colorado for storage.

Two passenger conductors employed on the Chesapeake & Ohio of Indiana were arrested on April 9, by United States deputy marshals on a charge of violating the Hepburn law, by permitting passengers to ride to and from Cincinnati and Chicago for less than the legal fare. It is reported that warrants against a number of other employees are in the hands of federal officers for similar offenses.

The transcontinental railroads are preparing to handle a record citrus fruit crop from California. Estimates prepared in Los Angeles assert that fully 45,000 car loads will be shipped from that state this season, as compared with 18,000 last year. Conferences have been asked by shippers' organizations in southern California with the railroad traffic officials to discuss plans for averting any possible car shortage.

The annual series of "onion specials" will soon be running from Texas to Chicago and the eastern markets. The vegetable is delivered in large quantities at Laredo, Tex., and from Laredo special trains are sent to St. Louis, Kansas City and Chicago, from which points the product is distributed north, west and east. Heavy shipments are also made from Laredo to Galveston and then by water to New York, New Orleans and other ports.

A quarterly meeting of the Southern Classification Committee was held at Chattanooga, Tenn., beginning on April 6. The docket for the meeting was large, including a number of important items affecting the paper box manufacturers, iron and steel, candy, agricultural implements and paint, and there was a large attendance at the meeting. The docket also included a number of items submitted by the Committee on Uniform Classification.

A reduction in freight rates on lumber from the Pacific coast to points on the Missouri river, ranging from 2½ to 4½ cents per 100 lb., was agreed to by representatives of the railways at a hearing before Special Examiner Wood of the Interstate Commerce Commission, held at Lincoln, Neb., last week. The reduction affects the rate to a large number of non-competitive points. The hearing was held on a complaint filed by the Omaha traffic bureau.

It is understood that an agreement has been reached between the commercial travelers' organizations in Georgia and the railroads of that state which has been approved by the Public Service Commission and under which the roads will restore the sale of interchangeable mileage books which was withdrawn when the commission ruled that mileage must be pulled on trains. This will permit traveling men to make as many stop-overs as they desire and still travel at the mileage book rate.

The Long Island Railroad, which occupies a comparatively small part of the space in the Pennsylvania station, Seventh avenue, New York City, has lately had such an increase of passenger traffic that the concourse, from which passengers descend the stairs to the Long Island trains, has had to be enlarged. It will be made 47 ft. longer, the addition being 125 ft. wide. This enlargement and the changes made necessary by it will cost $300,000. About 20,000 passengers go from this station to Long Island points each afternoon between four o'clock and seven.

A tentative set of proposed rules governing the weighing of carloads of freight, which was agreed upon at a recent conference held in Chicago on March 31, between the sub-committee of the American Railway Association Committee on Relations Between Railroads and the weighing committee of the National Industrial Traffic League, will be submitted to the two associations at their next meeting for ratification. In the case of the National Industrial Traffic League this will be the meeting on April 23, at Cleveland, and in the case of the American Railway Association it will be at the semi-annual meeting in New York in May. If the rules are accepted at these meetings they will be submitted to the Interstate Commerce Commission for its approval and promulgation.

At a conference of the traffic commissioners of seven western cities held in Denver on April 7, it was decided that a petition should be filed within 90 days with the Interstate Commerce Commission, asking for a general readjustment of freight rates into the trans-Missouri territory, unless a compromise can be reached between the carriers and the communities within 90 days. It was also decided to call a second conference at Denver, and the various communities are urged to send delegates. A conference is also to be held with representatives of the railways. The meeting was held under the direction of a special rate committee of the Denver Chamber of Commerce, and the cities represented were: Denver, Pueblo and Colorado Springs, Colo.; Salt Lake City, Utah; and Wichita and Hutchinson, Kan.

Car Surpluses and Shortages

Arthur Hale, chairman of the committee on relations between railroads of the American Railway Association, in presenting statistical bulletin No. 165, giving a summary of car surpluses and shortages by groups from November 30, 1912, to

CAR SURPLUSES AND SHORTAGES

Date	No. of roads.	Surpluses					Shortages				
		Box.	Flat.	Coal, gondola and hopper.	Other kinds.	Total.	Box.	Flat.	Coal, gondola and hopper.	Other kinds.	Total.
Group *1.—April 1, 1914	7	183	720	668	75	1,646	187	0	0	144	331
" 2.— " 1, 1914	31	2,220	503	3,579	945	7,247	30	0	567	0	597
" 3.— " 1, 1914	28	4,117	1,661	9,803	2,619	18,200	97	84	0	3	184
" 4.— " 1, 1914	11	7,682	1,099	6,677	1,093	16,551	50	0	0	25	75
" 5.— " 1, 1914	23	2,792	935	6,692	1,798	12,217	50	50	0	0	100
" 6.— " 1, 1914	27	10,357	964	4,478	7,162	22,961	2	10	11	0	23
" 7.— " 1, 1914	4	463	80	1,524	2,012	4,079	0	0	0	0	0
" 8.— " 1, 1914	18	3,661	478	2,406	3,062	9,607	0	0	23	1	24
" 9.— " 1, 1914	12	2,591	319	408	1,501	4,819	0	0	14	0	14
" 10.— " 1, 1914	23	7,815	2,218	4,428	10,364	24,825	9	0	0	0	9
" 11.— " 1, 1914	6	14,584	1,858	392	2,539	19,373	605	25	0	26	656
Total	190	56,465	10,835	41,055	33,170	141,525	1,030	169	615	199	2,013

*Group 1 is composed of New England lines; Group 2—New York, New Jersey, Delaware, Maryland and Eastern Pennsylvania lines; Group 3—Ohio, Indiana, Michigan and Western Pennsylvania lines; Group 4—West Virginia, Virginia, North and South Carolina lines; Group 5—Kentucky, Tennessee, Mississippi, Alabama, Georgia and Florida lines; Group 6—Iowa, Illinois, Wisconsin and Minnesota lines; Group 7—Montana, Wyoming, Nebraska, North Dakota and South Dakota lines; Group 8—Kansas, Colorado, Missouri, Arkansas and Oklahoma lines; Group 9—Texas, Louisiana and New Mexico lines; Group 10—Washington, Oregon, Idaho, California, Nevada and Arizona lines; Group 11—Canadian lines.

April 1, 1914, says: The total surplus on April 1, 1914, was 141,525 cars; on March 15, 1914, 132,010 cars, and on April 1, 1913, 68,792 cars.

It will be noted that the surplus cars have begun to increase after the temporary activity during March, while the shortage is reduced to practically a negligible figure.

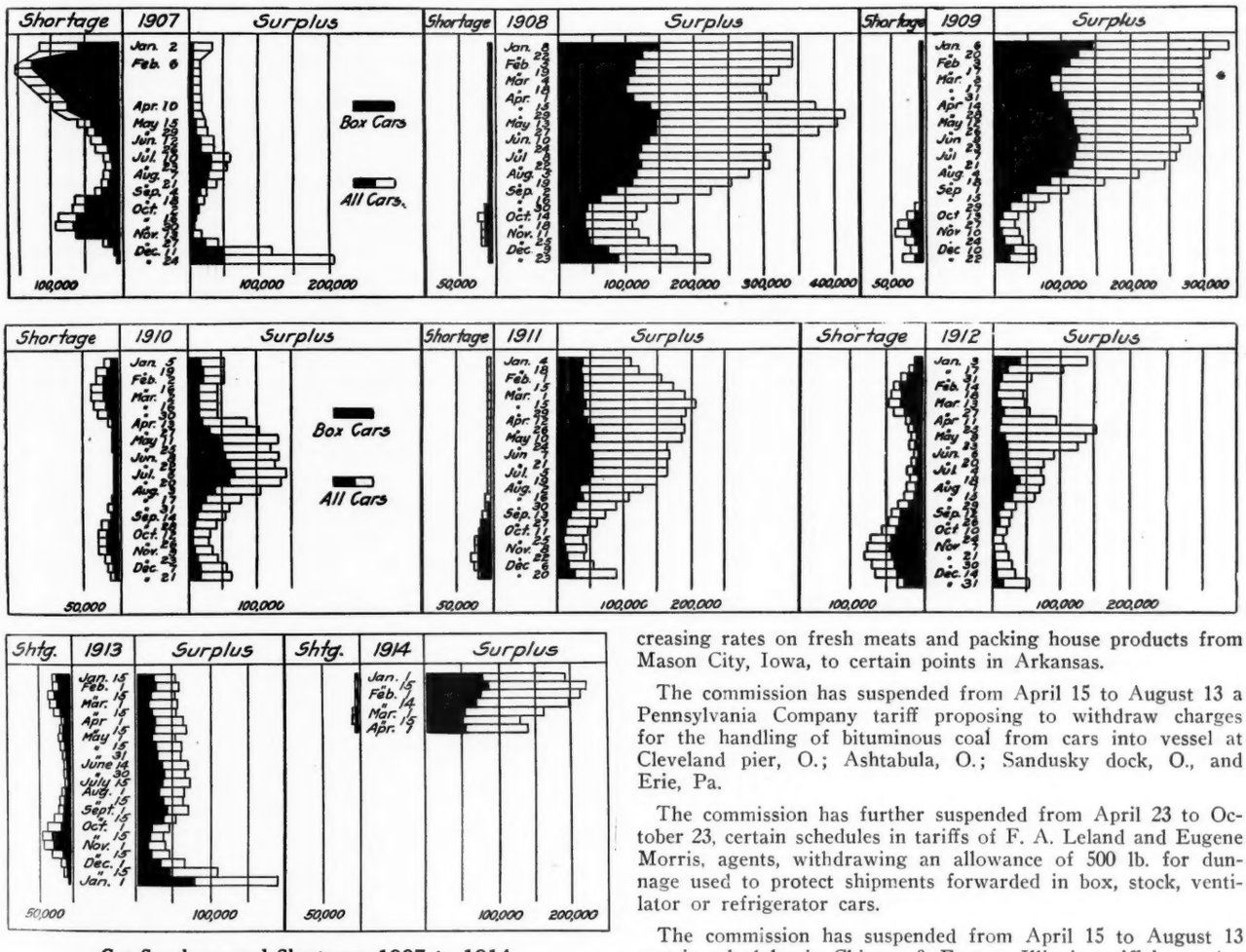
The increase in surplus box cars is general in all parts of the country except in group 8, covering Kansas, Colorado, Missouri, Arkansas and Oklahoma, and in group 10, covering the Pacific coast. In both of these groups, there is a small reduction in surplus.

There is a substantial increase in surplus coal cars except in group 3, covering the Ohio, Indiana and western Pennsylvania fields, where the surplus has been reduced to 9,803 cars. There is also a small reduction in group 8 referred to above.

The total shortage on April 1, 1914, was 2,013 cars; on March 15, 1914, 7,145 cars, and on April 1, 1913, 10,804 cars.

The reduction in shortage is general all over the country except in Canada, where there is a slight increase.

The accompanying table gives car surplus and shortage figures by groups for the last period covered in the report and the diagram shows total bi-weekly surpluses and shortages from 1907 to 1914.



Car Surpluses and Shortages, 1907 to 1914

Improvements in South Manchuria Railway Service.—The South Manchuria Railway has plans under way whereby it will be able to increase the passenger service on the main line between Dairen and Changchun by the establishment of a daily through service, to be put into effect by the end of the fiscal year March 31, 1915. At the same time the freight carrying capacity is to be increased to a maximum of 8,730 tons per day in each direction, and the average running mileage of coal trains increased to 90 miles a day.

Commission and Court News

INTERSTATE COMMERCE COMMISSION

The commission has suspended from April 10 to August 8, a Chicago, Burlington & Quincy tariff increasing rates on agricultural implements in carloads, from certain points in Missouri to Sioux Falls, S. D.

The commission has further suspended from April 26 to October 26 certain schedules in a tariff of E. H. Hinton, agent, increasing rates on lumber from points in Alabama and Georgia to Knoxville and Lenoir City, Tenn.

The commission has further suspended from April 15 to October 15 certain schedules in a tariff of F. A. Leland, agent, increasing rates on fresh meats and packing house products from Mason City, Iowa, to certain points in Arkansas.

The commission has suspended from April 15 to August 13 a Pennsylvania Company tariff proposing to withdraw charges for the handling of bituminous coal from cars into vessel at Cleveland pier, O.; Ashtabula, O.; Sandusky dock, O., and Erie, Pa.

The commission has further suspended from April 23 to October 23, certain schedules in tariffs of F. A. Leland and Eugene Morris, agents, withdrawing an allowance of 500 lb. for dunnage used to protect shipments forwarded in box, stock, ventilator or refrigerator cars.

The commission has suspended from April 15 to August 13 certain schedules in Chicago & Eastern Illinois tariff increasing rates on lumber in carloads, from Bismarck, Golden, Oak Hill and Broken Bow, Oklahoma, to St. Louis, Mo., Thebes, Ill., Memphis, Tenn., and other points.

The commission has suspended to August 13 certain tariffs filed by carriers in official classification territory proposing increased class and commodity rates between Quincy, Ill., Hannibal, Mo., Louisiana, Mo., and other points grouped therewith and points east of the Indiana-Illinois state line.

The commission has suspended from April 15 and later dates to August 13 the increased proportional class rates to and from Mississippi river crossings on traffic originating at or destined to points east of the Indiana-Illinois state line, and originating at or destined to points beyond the Mississippi river crossings.

The commission has suspended from April 15 to August 15 schedules published in tariffs of Pennsylvania Railroad, Northern Central, Philadelphia, Baltimore & Washington and West Jersey & Seashore increasing the charges for the switching of carload freight between points and industries on these lines at Baltimore.

The commission has suspended from April 15 to August 13 the following tariffs of the Chicago & Eastern Illinois, and the Vandalia, canceling joint class rates from Terre Haute and other points in Indiana to Kansas City, Mo., and other Mississippi river crossings, leaving in effect combination rates.

A joint complaint has been filed with the Interstate Commerce Commission by the Iowa State Board of Railroad Commissioners, the American Live Stock Association, the Corn Belt Meat Producers' Association and the Cattle Raisers' Association of Texas, alleging that the regulations and practices of southwestern railroads and connecting lines for the transportation of live stock are unjust, unreasonable and unlawful. The commission is requested to require the carriers to establish reasonable rates, regulations and practices.

The commission has suspended from April 15 to August 13 certain schedules in a tariff of W. H. Hosmer, agent, providing for the elimination of the Akron, Canton & Youngstown as a participating carrier and canceling joint rates on lumber in carloads from points in Minnesota and other states to stations on that railway. It is assumed that the carrier's action in providing for this cancellation of rates is due to a misunderstanding, as a supplement to the tariff, effective May 15, reinstates that railway as a participating carrier, and re-establishes the present joint rates, as of that date.

Lumber Rates to Chattanooga

In re lumber rates from local points on the Alabama Great Southern to Chattanooga, Tenn.

The commission finds that the carrier has not justified a proposed cancellation of commodity rates on lumber from Porterville, Ala., and points north to Chattanooga, and on shingles from Sulphur Springs, Ga., to the same destination and the substitution therefor of rates based on the defendant's mileage scale. The rates were reduced because of competition which does not now exist, but they were not made unreasonably low as compared to other lumber rates in the same and similar territory. That they have been in effect for some time likewise works in favor of their retention. (29 I. C. C., 646.)

Withdrawal of Commodity Rates on High Explosives Permitted

In re New England and Canadian high explosives rates. Opinion by Commissioner McChord:

The commission permits the withdrawal of commodity rates on high explosives from St. Louis, and related points to Philadelphia, New York, Boston and points taking the same rates, as well as to destinations in Canada, published in tariffs of agents Hosmer and Cameron. These rates are also published by Agent Morris as exceptions to the official classification. The commodity rates were equivalent rates issued for certain carriers not parties to the exceptions. (29 I. C. C., 697.)

Fertilizer Rates Reduced

Merchants & Manufacturers Association v. Cape Charles Railroad et al. Opinion by the commission:

The commission finds unreasonable the car load rate of $2.50 per net ton and the less than car load rate of $5.70 per net ton on fertilizer from Baltimore to Kiptopeke, Va., a point on the Cape Charles Railroad. Rates of $2.10 and $3.50 per net ton for shipments in carloads and less than carloads respectively are prescribed for the future. It is also required that corresponding changes be made in the rates to other stations on the Cape Charles Railroad. (30 I. C. C., 29.)

Grain and Grain Product Rates from East St. Louis.

In re Rates on Grain and Grain Products from East St. Louis, Ill., and Other Stations to Eastern Points. Opinion by Commissioner Harlan:

The commission finds justified a proposed cancellation by the Illinois Central of the latter's proportional or reshipping rates on grain and grain products from St. Louis, Mo., East St. Louis, Ill., and Madison, Ill., to points in the territory between Buffalo and Pittsburgh on the west and the Atlantic coast on the east. The Illinois Central does not derive an adequate revenue by its circuitous route and there are several other shorter routes with the same rates. It is also held that a denial of milling-in-transit privileges at Marine, Ill., does not result in undue discrimination. (30 I. C. C. 16.)

STATE COMMISSIONS

The Texas Railroad Commission has announced a hearing to be held on May 12, on a proposed regulation to govern in connection with the transportation of poultry in car loads, and also a proposed readjustment of the minimum weights on all kinds of live stock, together with a provision for the privilege on all lines of stopping in transit for loading and unloading at a charge of $5 per car.

The Indiana Public Service Commission has ordered a hearing on April 20, concerning the propriety of twelve railroads of the state canceling through joint rates from points on their lines in Indiana to stations on industrial or switching railroads; also canceling the absorption of switching charges of industrial railroads on Indiana intrastate traffic. The commission has also suspended for 30 days, pending the hearing, the effective date of the tariffs and supplements, insofar as they cancel such through joint rates and provide for the non-absorption of switching charges.

The Pennsylvania Public Service Commission has refused the application of the Pennsylvania, the Philadelphia & Reading, the Baltimore & Ohio and other roads, for authority to issue tariffs to take effect on five days' notice or to cancel, on the same notice, joint rates or allowances to industrial railroads and industries. Following the Interstate Commerce Commission's ruling on this subject the railroads notified shippers throughout the state that, after April 1, the flat rate would be made applicable only over their own lines. Shippers objected to the change and the commission forbade the changing of tariffs except on the full 30 days' notice.

COURT NEWS

The circuit court at Hot Springs, Ark., in a decision rendered on April 8, sustained the constitutionality of the full crew law passed at the last session of the Arkansas legislature, and the St. Louis, Iron Mountain & Southern was fined $50 and costs for violating the law.

Judge Stewart of the circuit court at Kirksville, Mo., on April 7, denied a petition of the Atchison, Topeka & Santa Fe to remove to the federal court a suit against the road filed by the attorney-general of the state to recover $2,000,000 for alleged overcharges in freight and passenger rates during the litigation over the state rate laws. On April 9 the court appointed a master to gather evidence and claims for overcharges in connection with the suit.

The United States Supreme Court, on April 6, handed down a decision by Justice Hughes in the case of the Union Lime Company against the Chicago & North Western and the Eden Independent Lime and Stone Company, affirming a decision by a Wisconsin court that the railroad commission of that state has the power to require the North Western to extend the Union Lime Company's private siding to the Eden plant, on the ground that it is "a part of the North Western railway." The fact that a spur track is built to serve one industry, the court holds, "does not militate against the devotion of the property there to a public use."

The Baggage Liability Case

The following is an abstract of the opinion signed by Justice Day, of the Supreme Court of the United States, in the case appealed from the Supreme Court of Massachusetts involving the liability of a railroad company for damage to baggage valued at more than $100, but as to the value of which no declaration had been made.

Catharine Hooker brought suit against the Boston & Maine to recover on account of the loss of baggage, and on appeal to the Supreme Court of Massachusetts the plaintiff was awarded $2,253.77 damages. The railroad company claims that the

damage should have been limited to $100. The baggage was checked on a first class ticket bought by the plaintiff (although not used by her, she traveling upon another similar ticket purchased by herself). No inquiry was made by the defendant on receiving the baggage as to its value. The lower court accepted as proven that there were no other means provided for transporting baggage which was declared to be of greater value than $100 than that for other baggage, and any reasonable person would infer from the outward appearance of the plaintiff's baggage that the value largely exceeded $100. The loss of the baggage was due to negligence of the defendant.

The defendant had the customary provision in its tariffs, which were filed with the Interstate Commerce Commission, limiting the amount which it was liable for to $100 unless a greater value was declared, and providing that for an excess value the rate will be half of the current excess baggage rate per 100 lbs. for each $100 or fraction thereof of increased value declared. The excess cost that would have been charged under this provision, had the plaintiff declared a value of $1,904.50, would have been $4.75.

It is to be borne in mind that the action as tried and decided was not for negligence of the railroad company as a warehouseman for the loss of baggage after its delivery at Sunapee Lake station, but was solely upon the contract of carriage in interstate commerce. In reaching its conclusion the Massachusetts court relied on the case of the *Pennsylvania Company v. Hughes,* 191 U. S., 477, in which case it was held that a state might apply its local law and policy to recover for the loss of a horse shipped in interstate commerce from Albany, N. Y., to Cynwyd, Pa., and injured by negligence of the carrier in Pennsylvania notwithstanding the bill of lading contained an express condition that the carrier assumed liability to the extent of the agreed valuation in event of loss. It was further held in the *Hughes* case that the Interstate Commerce act, in the respect then under consideration, had not enacted an exclusive rule upon which recovery might be had and the state might enforce its own regulations. Since the *Hughes* case the Hepburn act has been passed, and this court [the Supreme Court] holds that the interstate transportation of property had been regulated by federal law to the exclusion of the power of the states to control in such respect by their own policy of legislation. The filing of rates with the Interstate Commerce Commission, as the court has already held, makes the rates binding upon shipper and carrier alike. As to the finding that the plaintiff's baggage was apparently worth more than $100, it appears that the contents of the two trunks and suit case were not disclosed or known to the carrier and the finding in this respect, necessarily based on the appearance of the baggage, cannot be said to show a procurement of transportation in violation of the requirements of the filed schedules at a rate disproportionate to its own value.

Section 6 of the Interstate Commerce act requires that schedules state among other things "all other charges which the commission may require, all privileges or facilities granted or allowed, and any rules or regulations which in any wise change, affect or determine any part, or the aggregate of such aforesaid rates, fares and charges, or the value of the service rendered to the passenger, shipper or consignee."

It seems to us [the Supreme Court] that the ordinary significance of the terms used in the act would cover such requirements as are here made for the amount of recovery for baggage lost by the carrier. The requirement published concerning the amount of liability of the defendant based on additional payment where baggage was declared to exceed $100 in value, was determinative of the rate to be charged and did affect the service to be rendered to the passenger as it fixed the price to be paid for the service rendered in the particular case, and was, therefore, a regulation within the meaning of the statute.

If the charges filed were unreasonable, the only attack that could be made upon such regulation would be by proceedings protesting their reasonableness before the Interstate Commerce Commission. While they were in force they were equally binding upon the railroad company and all passengers whose baggage was transported by carriers in interstate commerce.

We do not think that the requirement of the Carmack amendment that a railway company receiving property for transportation in interstate commerce shall issue a receipt or bill of lading therefor, requires other receipt than baggage checks which it is shown were issued when the baggage was received in this case.

Railway Officers

Executive, Financial, Legal and Accounting

Guy Hopkins, acting general superintendent of the Louisiana Western and Morgan's Louisiana & Texas Railroad & Steamship Company, with headquarters at New Orleans, La., has been appointed vice-president of those lines.

Charles H. Markham, president of the Central of Georgia, has been elected to the new office of chairman of the board, with headquarters at Chicago, and William A. Winburn, vice-president at Savannah, Ga., has been elected president, with headquarters at Savannah.

Alfred Mackrille, auditor of freight receipts of the New York, New Haven & Hartford, at New Haven, Conn., has been appointed assistant general auditor; T. M. Prentice has been appointed assistant auditor, and A. R. Down has been appointed auditor of freight receipts, succeeding Mr. Mackrille, all with headquarters at New Haven. The former duties of H. M. Kochersperger, vice-president, in charge of finance and accounting, who has been granted leave of absence, have been assumed for the present in the financial department by A. S. May, treasurer, and in the accounting department by J. M. Tomlinson, general auditor.

M. J. Caples, vice-president in charge of operation of the Chesapeake & Ohio and the Hocking Valley, with headquarters at Richmond, Va., in order to devote all his time to the construction of a new line to connect these two roads and supervise the operation of the Hocking Valley, has been relieved of responsibility in connection with the operation of the Chesapeake & Ohio until the connecting line has been completed. He retains the position of vice-president of the Chesapeake & Ohio, and during his absence George P. Johnson, general manager at Richmond, Va., will be the active head of the operating department of the Chesapeake & Ohio.

H. W. Davies has been appointed assistant to the president and general manager of the Pacific & Idaho Northern, with headquarters at New Meadows, Idaho. He began railway work in 1889 in the local freight offices of the Richmond & Danville at Richmond, Va., and then held various positions with that company and its successor, the Southern Railway, including those of chief clerk and station accountant, traveling auditor, and chief clerk to the auditor of station accounts at Washington, D. C., until 1905, when he left the service of the Southern Railway to become chief clerk to the auditor of the Norfolk & Southern, now the Norfolk Southern. He remained in this position until February, 1907, when he was promoted to purchasing agent and chief clerk to the president of the same road. In 1913 the office of purchasing agent having been abolished, he was assigned to other duties; he subsequently left that company to go to the Pacific & Idaho Northern, and now becomes assistant to the president and general manager, as above noted.

James Russell, whose appointment as assistant to vice-president of the Denver & Rio Grande, with headquarters at Denver, Colo., has already been announced in these columns, was born in February, 1865. He began railway work with the Grand Trunk in 1879 and was employed as agent and operator until 1882. The following year he worked as telegraph operator for the Chicago, St. Paul, Minneapolis & Omaha, the Kansas Pacific and the Santa Fe, and from 1883 to 1887 was telegraph operator and train despatcher on the Canada Southern and the Michigan Central. He was then successively train despatcher, chief despatcher and superintendent of the St. Paul, Minneapolis & Manitoba and the Great Northern until 1903, when he was appointed superintendent of the Missouri Pacific. Four years later Mr. Russell became a superintendent of the Chicago, Burlington & Quincy, and from 1909 to January 1, 1914, he was general superintendent of the Spokane, Portland & Seattle. He was then appointed general superintendent of the Great Northern, which position he held until his recent appointment as assistant to the vice-president of the Denver & Rio Grande, as above noted.

Operating

C. Harsch, general agent of the Pere Marquette at Chicago, has been appointed also superintendent of terminals.

J. A. Hyde has been appointed superintendent of the Northern Texas & Oklahoma division of Wells, Fargo & Co. Express, with headquarters at Dallas, Tex., succeeding F. L. Selleck, resigned.

A. L. Currie, secretary of the Quebec, Montreal & Southern and the Napierville Junction at Montreal, Que., has been appointed superintendent of both these roads, with office at Sorel, Que., succeeding J. E. Roberts, promoted.

M. F. Leamy, assistant trainmaster of the Delaware & Hudson at Albany, N. Y., has been appointed trainmaster of the Saratoga division, succeeding C. J. Downey, transferred, and W. H. Davidson has been appointed assistant trainmaster of the Saratoga division, succeeding Mr. Leamy, both with headquarters at Albany.

D. F. Schaff has resumed the duties of superintendent of the Chicago and White Water divisions of the Cleveland, Cincinnati, Chicago & St. Louis, with headquarters at Indianapolis, Ind., succeeding C. S. Millard, acting superintendent, who has been appointed superintendent of the Peoria & Eastern division, with office at Indianapolis.

G. D. Brooke, superintendent of the Shenandoah division of the Baltimore & Ohio, with office at Winchester, Va., has been transferred as superintendent to the Ohio division of the Baltimore & Ohio Southwestern, with headquarters at Chillicothe, Ohio, succeeding J. D. Stack, resigned to go to another company, and S. A. Jordan. district engineer of maintenance of way at Baltimore, Md., succeeds Mr. Brooke.

H. E. Hutchens, general superintendent of the Southern Railway at Greensboro, N. C., has been appointed superintendent of passenger transportation, with headquarters at Washington, D. C. W. M. Cowhig, superintendent of transportation at Washington, has been appointed superintendent of freight transportation, with headquarters at Washington, and his former position has been abolished. R. E. Simpson, superintendent of the Knoxville division at Knoxville, Tenn., has been promoted to general superintendent of the Northern district, succeeding H. E. Hutchens, promoted. O. B. Keister, superintendent of the Mobile division at Selma, Ala., succeeds Mr. Simpson. F. S. Collins, trainmaster of the Charlotte division at Greenville, S. C., succeeds Mr. Keister, and M. O. Dunbar has been promoted to trainmaster of the Charlotte division, with headquarters at Greenville, S. C., succeeding Mr. Collins.

Traffic

E. B. Coolidge has been appointed general western agent of the Wheeling & Lake Erie at Chicago.

S. J. Henry has been appointed assistant general western freight agent of the Northern Pacific at Tacoma, Wash.

W. M. Porteous, freight agent of the Canadian Pacific at St. Louis, Mo., has been appointed district freight agent, with headquarters at St. Louis.

H. W. Pinnick, traveling passenger agent of the St. Louis & San Francisco lines at Houston, Tex., has been appointed district passenger agent at that place.

F. L. Word has been appointed live stock agent of the Georgia Southern & Florida, the Macon & Birmingham and the Hawkinsville & Florida Southern, with office at Atlanta, Ga.

J. F. Garvin, assistant general freight agent of the Missouri, Kansas & Texas of Texas, has been appointed general freight agent, with headquarters at Dallas, Tex., succeeding J. L. West, promoted.

J. Beels has been appointed dairy agent of the Chicago, Burlington & Quincy, with headquarters at St. Paul, Minn., succeeding H. D. Weber, resigned, and E. N. Altmeyer has been appointed assistant dairy agent, succeeding Mr. Beels.

James T. Nicol has been appointed general agent of the Waterloo, Cedar Falls & Northern, with office at Cedar Rapids, Iowa. He will represent the company in traffic and operating matters. William C. Welsh succeeds Mr. Nicol as commercial agent at Waterloo, Iowa.

J. K. Dyer, New England freight agent of the Lehigh Valley, with offices at Boston, Mass., and New Haven, Conn., has been appointed commercial agent, with office at Boston, and his former position has been abolished. M. J. Ormond has been appointed commercial agent, with office at New Haven.

L. C. Morris has been appointed city passenger and ticket agent of the Lehigh Valley, with office at Rochester, N. Y., and E. M. Horner, district passenger agent at Rochester, having resigned to become associated with the Rochester Chamber of Commerce, the office of district passenger agent has been abolished.

L. D. Knowles, assistant general freight agent of the Missouri Pacific, St. Louis, Iron Mountain & Southern, Denver & Rio Grande and Western Pacific, at Omaha, Neb., has been appointed general agent of those lines at Kansas City, Mo., succeeding F. C. Gifford, who resigns to engage in private business. H. N. Atwood, agent at Pine Bluff, Ark., has been appointed commercial agent at Milwaukee, Wis., in place of A. R. Malcolm, who succeeds Mr. Knowles.

Engineering and Rolling Stock

George W. Boschke has resigned as chief engineer at Portland, Ore., of the Oregon-Washington Railroad & Navigation Company, effective May 1.

L. A. Stoll, assistant superintendent of shops of the Chicago, Burlington & Quincy, at Aurora, Ill., has resigned to engage in other business. C. W. Robertson has been appointed general foreman of locomotive repairs at Aurora.

H. C. Lothholz, assistant engineer of design of the Chicago, Milwaukee & St. Paul, has been appointed engineer of design, with headquarters at Chicago, succeeding J. H. Prior, resigned to become assistant chief engineer of the Illinois Public Utilities Commission.

P. W. Helwig, general car foreman of the Minneapolis & St. Louis, at Minneapolis, Minn., has been appointed master car builder of the Chicago & Alton, with headquarters at Bloomington, Ill., succeeding T. M. Ramsdell, resigned to accept service with another company.

Henry Gardner, supervisor of apprentices of the New York Central & Hudson River, has resigned to accept a position with the Baltimore & Ohio as assistant shop superintendent at the Mt. Clare shops, Baltimore, Md. He will be succeeded on the New York Central by Wilbur D. Arter.

Robert Collett, superintendent of locomotive performance of the St. Louis & San Francisco, has resigned to take effect April 20, at which time he will enter the service of The Pearce Oil Corporation, as assistant manager of the railway lubricating department, with headquarters at St. Louis, Mo.

J. B. Myers, division engineer of the Baltimore & Ohio at Cumberland, Md., has been appointed district engineer of maintenance of way, with office at Baltimore, Md., succeeding S. A. Jordan, transferred. Phillip Petri, division engineer at Connellsville, Pa., succeeds Mr. Myers. F. G. Hoskins, assistant division engineer of the Pittsburgh division at Foxburg, Pa., succeeds Mr. Petri, and H. L. Gordon, assistant engineer at Baltimore, Md., succeeds Mr. Hoskins.

E. G. Lane, who has been in the general office of the Baltimore & Ohio at Baltimore, Md., as assistant engineer on the operating staff, has been appointed district engineer maintenance of way of the Baltimore & Ohio Southwestern, with headquarters at Cincinnati, Ohio, to succeed H. B. Dick, granted leave of absence on account of ill health. Mr. Lane formerly was division engineer of the New Castle division of the Baltimore & Ohio, engineer maintenance of way at Pittsburgh for five years, and since January, 1912, in the general office at Baltimore.

The Central of New Jersey announces that two committees have been formed to co-operate with the Interstate Commerce Commission in making a valuation of the company's property in accordance with the federal law. The committees are as follows: Advisory Committee—W. G. Besler, vice-president and general manager; Jackson E. Reynolds, general attorney; and Joseph O. Osgood, chief engineer. Valuation Committee—Charles Hansel, consulting valuation engineer,

chairman; Carl Tombo, principal assistant valuation engineer; E. Y. Allen, assistant valuation engineer; Herbert Forsyth, assistant valuation engineer; J. H. Moore, assistant real estate and tax agent; George Holmes, assistant counsel; and J. A. Taylor, comptroller.

A. M. Traugott, whose appointment as division engineer of the Virginian Railway, with headquarters at Princeton, W. Va., has been announced in these columns, was born on July 31, 1882, at Rochester, N. Y. He was educated at Purdue University, and during the summer of 1900, was a rodman on the Buffalo, Rochester & Pittsburgh, and later was rodman on the Delaware, Lackawanna & Western. In February, 1903, he entered the service of the Virginian Railway, and has been in the continuous service of that road ever since, successively as rodman, draftsman and transitman on preliminary and location surveys in Virginia and West Virginia, and then as instrument man and resident engineer on construction work and later as locating engineer on preliminary surveys. He was subsequently appointed resident engineer in charge of the first and second divisions, and now becomes division engineer of the third and Deepwater divisions of the same road, as above noted.

Purchasing

Daniel Delaney has been appointed stationer of the Chicago & Alton, with headquarters at Chicago, succeeding George Bleh, resigned.

L. H. Tutwiler, traveling storekeeper of the Baltimore & Ohio system, with office at Baltimore, Md., has been appointed district storekeeper, with headquarters at Mount Clare shops, Baltimore. F. A. Murphy, traveling storekeeper at Baltimore, has been appointed district storekeeper, with headquarters at Wheeling, W. Va., and the position of traveling storekeeper has been abolished. E. W. Thornley, storekeeper at Glenwood, Pa., has been appointed district storekeeper, with headquarters at Glenwood shops, Pittsburgh, Pa., and H. P. McQuilkin, storekeeper at Washington, Ind., has been appointed district storekeeper, with headquarters at Cincinnati, Ohio.

OBITUARY

Edward White, formerly from 1885 to 1898, treasurer of the Erie, with office at New York, died at his home in Brooklyn on April 12, at the age of 70.

Joseph Judson Brooks, general counsel of the Pennsylvania Lines West of Pittsburgh, with office at Pittsburgh, Pa., died suddenly in that city on April 11. Mr. Brooks was born in 1845 at Salem, Ohio, and graduated from Yale University and Cambridge Law School. In 1881 he became assistant counsel of the Pennsylvania Lines West of Pittsburgh, and since 1893 had been general counsel of the same lines.

Sir William Whyte, director and formerly, from January, 1904, to October, 1911, vice-president of the Canadian Pacific, died on April 14, at San Diego, Cal. He was born on September 15, 1843, at Charleston, Scotland, and began railway work in May, 1862, as station agent on the West of Fife Railway, Scotland. From July, 1863, to April, 1883, he was in the service of the Grand Trunk, holding various positions, including those of brakeman, foreman freight department, yardmaster, conductor, stationmaster and freight and passenger agent, and division superintendent. He was then to May, 1884, in the service of lines now forming part of the Canadian Pacific, as general superintendent of the Credit Valley, then general superintendent of the Ontario & Quebec which also included the Credit Valley and Toronto Grey & Bruce. In May, 1884, he was appointed general superintendent of the Ontario division of the Canadian Pacific which embraced all lines in Ontario west of Smith's Falls Junction, Ont.; from May, 1885, to October, 1886, he was general superintendent of the Eastern division as well as the Ontario division and then to May, 1897, was general superintendent of the Western division. He was promoted to manager of the western lines, including all lines west of Lake Superior in May, 1897, and four years later was appointed assistant to president. In January, 1904, he was elected second vice-president, and retired as vice-president on September 30, 1911, at which time he was elected a director of the same road.

Equipment and Supplies

LOCOMOTIVE BUILDING

The Norfolk & Western is in the market for 40 Mallet type locomotives.

The Coal & Coke has ordered 2 consolidation type locomotives from the Baldwin Locomotive Works.

The Chicago & North Western is reported to be in the market for 35 locomotives. This item has not been confirmed.

The Lehigh Coke Company, South Bethlehem, Pa., has ordered one six-wheel switching locomotive from the Baldwin Locomotive Works.

The Ferro Carril del Pacifico has ordered 2 Forney type (0-4-2) locomotives from the American Locomotive Company for service in Colombia. These locomotives will have 11 by 16 in. cylinders, 33½ in. driving wheels, a total weight in working order of 42,000 lb., and a steam pressure of 165 lb.

The Pisco-Ica Railway., operating a 45-mile standard gage line in Peru, has ordered one 2-4-0 type locomotive from the American Locomotive Company. This locomotive will have 12 by 18 in. cylinders, 34 in. driving wheels, a total weight in working order of 45,000 lb., and a steam pressure of 165 lb.

The Southern, having now placed approximately 10 orders for a total of 75 locomotives, has thus completed its present requirements for motive power. Included in the total number are: 45 Mikado type freight locomotives, 20 of which are to be supplied by the American Locomotive Company and 25 by the Baldwin Locomotive Works; 15 Pacific type passenger locomotives, of which 10 will be supplied by the American Locomotive Company and 5 by the Baldwin Locomotive Works; 2 eight-wheel switching locomotives to be built by the Baldwin Locomotive Works and 13 six-wheel switching locomotives to be built by Lima Locomotive Corporation. All of the locomotives will be equipped with the Chambers throttle valve and all but the switching locomotives will have superheaters.

CAR BUILDING

The Charlotte Harbor & Northern is in the market for 30 phosphate cars.

The Pennsylvania Railroad has ordered 41 all-steel box cars from its Juniata shops.

The Solvay Process Company, Syracuse, N. Y., is in the market for 50 75-ton phosphate cars.

The Chicago, Burlington & Quincy has ordered 1,000 freight cars from the Haskell & Barker Car Company.

The Southern Pacific is reported to be in the market for 930 50-ton gondola, 100 50-ton National dump, 203 12,500-gal. capacity tank, 400 automobile and 400 stock cars. This item has not been confirmed.

The Southern, which has now completed its requirements for freight and passenger cars has placed orders for a total of 3,250 freight cars and 54 passenger cars. The orders for the former include 1,450 30-ton ventilator box cars and 500 50-ton flat cars ordered of the American Car & Foundry Company; 750 30-ton ventilator box cars ordered of the Mt. Vernon Car Manufacturing Company, and 200 caboose, 1,050 30-ton ventilator box, 100 30-ton stock and 25 poultry cars ordered of the Lenoir car works. The orders for passenger cars consist of 35 coaches and 5 combination passenger and baggage cars ordered of the Pressed Steel Car Company; 5 combination baggage and mail and 5 combination baggage and express cars ordered of the American Car & Foundry Company and 4 dining cars ordered from the Barney & Smith Car Company.

Supply Trade News

The L. S. Brach Supply Company has moved its Chicago office from the Karpen building to the ninth floor of the Lytton building.

The Asbestos Protected Metal Company, Beaver Falls, Pa., has removed its Pittsburgh office to 1611 Bennedum-Trees building.

The Foote-Burt Company, Cleveland, Ohio, on April 1 opened an office at 436 Wells building, Milwaukee, Wis., with Charles Gordon in charge.

The general offices of the Orenstein-Arthur Koppel Company have been moved from Pittsburgh to Koppel, Pa., in order that they may be put in closer touch with the plant.

Charles P. Williams, who has represented the National Lock Washer Company of Newark, N. J., in Chicago and the west for several years has left the service of that company.

The Ehret Magnesia Manufacturing Company, Valley Forge, Pa., will move its Chicago office on May 1 from 371 West Ontario street to the Gibbons building, 20 E. Jackson Boulevard.

Muir B. Snow has been elected president and general manager of the Detroit Twist Drill Company, Detroit, Mich., to fill the position formerly occupied by his brother, Neil W. Snow, deceased.

Frederick T. Connor, formerly with the Joliet Railway Supply Company, has recently been appointed western railway sales agent for the Carbon Steel Company of Pittsburgh, Pa., with offices in the Railway Exchange building, Chicago.

The Continental Railway Supply & Equipment Company, Chicago, has been incorporated with $300,000 capital stock to manufacture and market railroad equipment. The incorporators are Oglesby Allen, Jr., Joseph T. Williams and Thomas T. McDonough.

Walter A. Johnson, formerly of Atlanta, Ga., has been appointed pneumatic tool manager at the Pittsburgh branch of the Ingersoll-Rand Company, New York. C. F. Overly, formerly of Pittsburgh, has been appointed pneumatic tool manager at the Cleveland office.

The Dearborn Chemical Company, Chicago, has transferred its southeastern branch office from Birmingham, Ala., to Atlanta, Ga., 1407 Candler building, where C. H. Everett and J. F. Boutelle, representing the Dearborn Company in that territory, will have their headquarters.

The L. S. Brach Supply Company, New York, has recently concluded arrangements with the Railroad Signal Supply Company, Hackney building, St. Paul, Minn., whereby the latter will handle the Brach automatic flagmen, lightning arresters, etc., in St. Paul, Minneapolis, Duluth and Winnipeg.

The Standard Steel Castings Company, Cleveland, Ohio, has placed in operation a new shop, 80 ft. by 253 ft., and has installed an additional two-ton convertor, thus increasing the capacity of the plant to 25 tons of castings per day. Thomas B. Lavey, who for the past seven years has been superintendent of the Isaac G. Johnson plant at Spuyten Duyvil, N. Y., has been made superintendent.

The Ingersoll-Rand Company, New York, has opened a new branch office and warehouse in Los Angeles, Cal., at 1036 Union Oil building. W. A. Townsend, formerly manager of the company's El Paso office, will be in charge, being succeeded at El Paso by J. D. Foster. The same company also announces the opening of a branch office at Juneau, Alaska, under the charge of Frank Carroll.

James T. Gardner, who has been engaged in the railway equipment business since 1891, with office recently in the Railway Exchange building, Chicago, died suddenly at his residence in Chicago on April 9. He was in railway service from 1875 to 1890, beginning as a telegraph operator on the Philadelphia & Erie, and from 1883 to 1887, was general superintendent of the Buffalo, Rochester & Pittsburgh. From 1887 to 1890, he was general manager of the Cincinnati, Saginaw & Mackinaw Railway.

On April 15 the offices of the United States Steel Corporation and its subsidiaries in Chicago were removed from the present quarters at 72 West Adams street, to the new Continental & Commercial National Bank building, Adams and LaSalle streets, occupying the eleventh, thirteenth, fourteenth, fifteenth, sixteenth and seventeenth floors. The offices removed include those of the Illinois Steel Company, Indiana Steel Company, Universal Portland Cement Company, American Bridge Company, Gary Land Company, Bunsen Coal Company, Elgin, Joliet & Eastern, American Steel & Wire Company, National Tube Company, American Sheet and Tin Plate Company, and the Carnegie Steel Company.

Frank H. Clark, formerly sales manager of the railroad department of the Watson-Stillman Company, New York, has recently bought the Chambers throttle valve business of that company and established the Chambers Throttle Valve Company with himself as president. Mr. Clark was born in New York on March 8, 1872. He obtained his start in the railway supply business in 1890 when he entered the employ of the Standard Coupler Company, of which his father was president. In 1893 he went south to Atlanta, Ga., to engage in a general railway and mill supply business, and in 1897 in connection therewith opened a machine shop and foundry to which he later added a boiler repair shop. Three years later he sold his business and returned to New York to enter the sales department of the Townsend & Downey Ship Building Company. When this company went out of business in 1903 he became vice-president and treasurer of T. N. Motley & Company, Inc., dealing in railway supplies at New York. He remained with this company about five years and then left to enter the railroad sales department of the Watson-Stillman Company. About three years ago he brought to that company the throttle valve invented by John Chambers, of the Atlantic Coast Line, and has since devoted a very large portion of his time to the development and introduction of that appliance. The office of the new company is at 30 Church street, New York.

F. H. Clark

TRADE PUBLICATIONS

Hangers.—The Hess-Bright Manufacturing Company, Philadelphia, Pa., has issued a booklet describing Hess-Bright ball bearing hangers.

Electrical Appliances.—The National Electric Specialty Company, Chicago, has issued catalog No. 11 describing the various types of Vac-M. lightning arresters.

Valve, Service and Roadway Boxes.—The Central Foundry Company, New York, has issued a new pocket size catalog of its valve, service and roadway boxes of various types and sizes for water or gas.

San Pedro, Los Angeles & Salt Lake.—The passenger department has issued an attractive booklet entitled "California in Summer," which describes and illustrates a large number of the points of interest for tourists.

Pneumatic Tools.—The Chicago Pneumatic Tool Company has issued bulletins No. 152, 153, 154 and 172, describing "Chicago Gatling" drills, the "Chicago" sinker, the "Chicago" stoker, and No. 5 "Chicago" plug and feather drill.

Railway Construction

Beaver, Meade & Englewood.—This company, which was incorporated about two years ago, to build from Beaver, Okla., north to Meade, Kan., 40 miles, according to press reports will start work at once on the section from Beaver north to a connection with the Wichita Falls & Northwestern at Forgan. C. C. Tracy, Beaver, was president at the time the company was incorporated.

Charleston, Parkersburg & Northern.—The plans of this company call for building from Parkersburg, W. Va., south via Rockport, Sandyville, Ripley, Fairplain, Kenna, Sissonville and Guthrie to Charleston, about 75 miles. K. B. Stephenson is president, and R. R. Cutler is engineer, Parkersburg, of the railroad. According to press reports the West Virginia Security & Construction Company was recently incorporated to build this line. E. H. Watson, South Bend, Ind., is president, and H. H. Archer, Parkersburg, W. Va., is vice-president of the construction company. (April 25, 1913, p. 973.)

Chesapeake & Ohio.—This company is considering the question of building under a subsidiary company, a connecting line from the Chesapeake & Ohio at a point near South Portsmouth, Ky., to the Hocking Valley, at a point near Columbus, Ohio, about 93 miles. M. J. Caples, vice-president, will have charge of the work.

Delaware & Hudson.—The report of this company for the year ended December 31, 1913, shows that a passing siding from West Chazy to Canada Junction, also 80-car passing sidings at Wadhams, Crown Point and Montcalm Landing, N. Y., and additional yard tracks at Rouses Point were constructed during the year. Surveys have been made and the right of way secured for the Wilkesbarre Connecting building a connecting line between the Pennsylvania Railroad and the lines of the Delaware & Hudson near Wilkesbarre. The grading work on this line is nearing completion. The enlargement of the freight house and provision of additional tracks at Green Island, and the improvement of the station and yard facilities at Sidney, also the construction of additional yard and car repair tracks, new engine house, ash pit, turntable and locomotive coaling station at Mechanicsville were completed during the year. Improvements at Albany, N. Y., including the buying of additional land, rearrangement of tracks and putting up a general office building and freight terminal, have been authorized. The work of renewing and strengthening bridges on the main lines to carry heavier rolling stock was continued during the year; this work will probably be completed during 1914. A new passenger station was built at Riverside, N. Y., and the old passenger station remodeled for use as a freight house. Extensive station and yard improvements have been undertaken at Ticonderoga, N. Y., including a new passenger station, and there are under way minor improvements to stations and freight facilities at Binghamton, Plattsburgh and North Creek.

Delaware, Lackawanna & Western.—The report of this company for the year ended December 31, 1913, shows that the work of building second, third and fourth tracks at different points on the line was carried forward during the year; also the construction of new yard, side and passing tracks at various points. Work was also continued on the new line building from Clarks Summit, Pa., to Hallstead, and the company expects that this work will be finished by June, 1915. During the year a number of new passenger and freight stations were constructed at various places, and grade crossing elimination work was carried out at a number of important points on the road. The most important work the company has planned for the coming year is the construction of new passenger terminal facilities at Buffalo, N. Y.

Lacombe & Blindman Valley.—A contract for the construction of this line has been let to the Middle West Construction Co., in place of other contracts made in 1913. The line from Lacombe, Alta., to Rimbey, about 38 miles, is expected to be completed by October 1, and a section will be ready for operation by July, 1915. During the latter part of 1913, about six miles of grading was completed. J. C. Gibson, president, Toronto, Ont.; Francombe & Inkster, engineers, Edmonton, Alta.

Nevada-California-Oregon.—This company will begin work soon on a number of improvements to the line now in operation from Reno, Nev., north to Lakeview, Ore., and will later build an extension, it is said, north of Lakeview. The extension is eventually to be built to a connection with one of the transcontinental lines.

Oklahoma, New Mexico & Pacific.—According to press reports a contract has been given to Amis & Deen, Roswell, N. Mex., to build a five-mile section from the present end of track, west, to complete the line to Ringling, Okla. It is expected that the work will be finished by the middle of May. The company also expects to carry out work during 1914 on the extension from Ringling west to a connection with the Rock Island at Lawton. (March 27, p. 767.)

Piedmont & Northern Lines (Electric).—According to press reports this company intends to build an extension from Gastonia, N. C., to Bessemer City, about 5 miles. This is a section of the gap between Gastonia, N. C., and Spartanburg, S. C., yet to be built to connect the northern and southern lines.

St. Francis Valley.—The authorized line of this company is from a point at or near Drummondville, Que., southeast following the St. Francis river to Richmond, thence continuing south of Sherbrooke to or near Stanstead, about 80 miles. C. B. Hibbard, Iberville, Que., is interested.

South Florida & Gulf.—Incorporated with a capital of $50,000 to build from Kenansville, Osceola county, Fla., south to a point on Kissimmee river near Bassenger, 36 miles. H. F. Benter, Kissimmee, Fla., is secretary and treasurer.

Texas Roads (Electric).—Surveys for the line from Dallas, Tex., to Terrell, about 30 miles, have been made, it is said, and the necessary right of way and franchises are now being secured. The Stone & Webster Engineering Corporation, Boston, Mass., is back of the project.

Tioga Gravel Company's Lines.—An officer writes that location is now being made for a line to be built from Gravel Pit to Alexandria, La., about eight miles, and it is expected that the line will be built in the near future. The company already owns a line connecting with the St. Louis, Iron Mountain & Southern at Simms, 11 miles north of Alexandria. A. H. Stille, president and general manager; I. L. Thomas, superintendent, Alexandria. (See Louisiana Roads, April 3, p. 811.)

Washington Roads.—According to press reports the Carlisle-Pennell Lumber Company, represented by O. O. Ort, Centralia, Wash., is making surveys for a logging line to be built from Alpha, Wash., to the main line of the Northern Pacific at a point between Chehalis and Napavine. The line is to be built to provide an outlet for lumber from the Onalaska Lumber Company, which is building two mills at Alpha.

RAILWAY STRUCTURES

Chattanooga, Tenn.—The Cincinnati, New Orleans & Texas Pacific is building with its own forces a passenger coach repair and paint shop at Chattanooga. The building will be 300 ft. long, and will be provided with four tracks to hold three cars each.

Green Cove Springs, Fla.—Work has been started on a new station, it is said, for the Atlantic Coast Line at Green Cove Springs. The structure will cost about $25,000.

Indiana Harbor, Ind.—The Pennsylvania Lines have completed plans for new shop buildings to be located at this point.

Ottawa, Ont.—The Railway Commission of Canada has authorized the Grand Trunk to build five bridges on the Nineteenth district, also to build other bridges as follows: Over Grand river, near Paris; over the Brantford & Tilsonburg tracks, near Brantford, and at Milton, also to reconstruct the bridge over Vanstone's pond near Lansdowne, all in the province of Ontario.

Savannah, Ga.—The Atlantic Coast Line will rebuild a number of structures recently destroyed by fire, it is said, at Savannah.

Railway Financial News

Chicago, Rock Island & Pacific Railway Company.—This road has sold $7,500,000 two-year 6 per cent. collateral trust notes, dated February 16, to William A. Read & Company. These notes are secured by deposit of $9,989,000 of the company's refunding mortgage 4 per cent. gold bonds and by two smaller issues of subsidiary companies. They are expected to provide for the company's needs until July 1, when it is hoped that the reorganization plans will have been arranged.

Detroit, Toledo & Ironton.—The Public Utilities Commission of Ohio has approved the plans of reorganization of this company. (See December 26, 1913, issue, page 1250.)

Missouri, Kansas & Texas.—The following have been elected directors of the Missouri, Kansas & Texas of Texas: Frank Trumbull, New York, chairman; C. E. Schaff, E. D. Steger, M. H. Wolfe, A. F. Platter, W. H. Dougherty, William Bacon, H. B. Perkin and G. B. Taliaferro, all of Texas.

New York Central & Hudson River.—J. P. Morgan & Co., New York, bought from the company $40,000,000 4½ per cent. refunding mortgage bonds of 1913-2013 and have already sold privately $15,000,000 of these bonds and will, it is understood, shortly offer $25,000,000 additional. The bankers have also an option on $30,000,000 more of the same bonds, thus making the total sale by the railroad company, if the bankers avail themselves of their option, $70,000,000.

The refunding and improvement mortgage is a lien next to the consolidation mortgage on the railroad owned by the New York Central on three-quarters of the stock of the Hudson River Bridge Company at Albany, and on the New York Central leasehold interests in the Troy & Green Bush, New York & Harlem, West Shore and Beech Creek railroads. It is also a lien on the leases to the New York Central, of the Beech Creek extension, the Geneva, Corning & Southern, the New Jersey Junction, and the Walkill Valley railroads, on the stock owned by the New York Central in the New York & Harlem, West Shore, Beech Creek extension, Geneva, Corning & Southern, and New Jersey junction railroad companies, and on the bonds of the Beech Creek, and Beech Creek extension companies owned by the Central.

The New York Central owns $45,289,200 out of $50,000,000 Lake Shore stock, and that stock is pledged as security for $90,578,400 of New York Central 3½ per cent. Lake Shore collateral bonds. The Central's equity in this stock is pledged under the refunding and improvement mortgage. Upon any consolidation of the New York Central and Lake Shore, the lien of this mortgage will be extended to cover the railroad now owned by the Lake Shore.

The directors announced that they have received the required number of consents (75 per cent.) from holders of the Lake Shore & Michigan Southern collateral trust bonds to the consolidation of the two roads. The New York Public Service Commission has already approved of this consolidation and it is said that the consent of six other state commissions will be required.

New York, New Haven & Hartford.—The Department of Justice has announced the names of the trustees for the New Haven trolley systems. For the Connecticut company Judge Walter C. Noyes, of New London, Conn.; William W. Hyde, of Hartford; L. B. Brainard, of Hartford; George E. Hill, of Bridgeport, and Charles Cheney, of South Manchester, have been agreed upon. For the Rhode Island company, Rathbone Gardner, Theodore F. Green, John C. Ames, John P. Farnsworth and Charles C. Mumford, all of Providence, R. I., have been agreed on.

See also statement given out by the New Haven management presented elsewhere in this issue.

Norfolk Southern.—The directors have decided to omit the usual quarterly dividend of one-half of 1 per cent., due April 1. Dividends have been paid regularly at the rate of 2 per cent. per year since February, 1911.

Northwestern Pacific.—This company has applied to the California Railroad Commission for permission to issue $5,543,000 first and refunding 4½ per cent. bonds in addition to the $17,708,000 already held by the Southern Pacific.

Pennsylvania.—The report of the Pennsylvania system for February shows total operating revenue of the lines east of Pittsburgh of $16,514,982 for February, a decrease of $2,219,938; total operating expenses of $15,932,345, a decrease of $369,348; railway operating income of $582,636, a decrease of $1,850,589. The lines west of Pittsburgh show total operating revenue of $7,795,226, a decrease of $1,391,225; total operating expenses of $7,532,595, a decrease of $731,686; railway operating income of $262,631, a decrease of $659,538. The total system shows operating revenue from January 1 to February 28 of $51,899,659, a decrease of $6,567,331; total operating expenses of $48,089,958, a decrease of $2,619,944; railway operating income of $3,809,701, a decrease of $3,947,386.

Union Pacific.—The directors have decided to declare a quarterly dividend of 2 per cent., thus reducing the annual rate on the stock from 10 per cent. to 8 per cent. Judge Lovett has given out the following statement:

"It is manifestly proper that the next regular dividend on the common stock of this company should be at the rate of 8 per cent. per annum.

"There seems to persist some misunderstanding respecting the dividend policy of this company. When the extra dividend was declared last year it was distinctly stated that as the stockholders would receive a return of 2.01 per cent. per annum from the B. & O. stock and cash distributed, and the regular dividend would be reduced to 8 per cent. per annum. While the actual payment of the extra dividend has been postponed owing to litigation, the condition remains the same, that when the extra dividend is paid it will be to stockholders of record March 1, and will carry with it all dividends paid on B. & O. stock after April 1 and interest from that date on the cash part of the dividend.

"As the stockholders will thus eventually receive these accretions, it is manifestly proper that the next regular dividend on the common stock of this company should be at the rate of 8 per cent. per annum.

"The next semi-annual dividend of the Baltimore & Ohio will be payable September and will cover the period from March 1. It is hoped that before that date pending litigation will be disposed of.

"Of course, if the payment of the extra dividend should be permanently enjoined I should expect the Union Pacific to pay its stockholders the difference between the 8 per cent. and 10 per cent. rate, since in that case it would retain the cash and Baltimore & Ohio stock, which through its extra dividend it has undertaken to distribute."

Union Terminal Company (Dallas, Tex.).—This company has sold to William Salomon & Co., New York, $2,193,000 first mortgage 5 per cent. bonds of April 1, 1912-1942. This is part of an authorized issue of $5,000,000 secured by a first mortgage on the passenger terminals of the Atchison, Topeka & Santa Fe; Southern Pacific; Colorado & Southern; Missouri, Kansas & Texas; Texas & Pacific; Chicago, Rock Island & Pacific; St. Louis Southwestern, and St. Louis & San Francisco in Dallas, which companies have taken a 99-year lease of the property. If any company default in the payment of the proportionate amounts due, the remaining companies agree to make up the defaulted payments.

Wabash.—The reorganization plan, in its final form, will be ready for submission to state railroad commissions within a few days, it is expected, and if no radical changes are made by the state commissions the bankers have agreed to underwrite the plan. As already mentioned in the *Railway Age Gazette*, $30,000,000 will be raised for reorganization purposes through a $20 per share assessment on both the preferred and common stocks; $14,000,000 new first refunding and extension 5 per cent. bonds will be sold at 85, and $2,250,000 will be received from the Wabash-Pittsburgh Terminal in settlement of about $7,000,000 claims. (February 27, p. 452.)

Cuba to Have an Elevated Railroad.—On February 19 the common council of Havana, Cuba, granted a franchise for a network of elevated railroads in that city.